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# New Crushing Plant of Inland Lime and Stone Co.

*General view of plant from the breakwater, with primary crusher house at extreme right, loading tower at extreme left*

## Designed for Large Production and with Novel Methods of Storing and Handling

OF THE CRUSHED STONE PLANTS put into operation during the past year, that of the Inland Lime and Stone Co. at Port Inland, near Manistique, Mich., is particularly interesting both from the standpoint of size and methods used. Designed for an annual production capacity of some 2,000,000 tons, it is expected to produce around 1,000,000 tons during 1931. It was completed and put into operation in November, 1930, and brief mention of the plant arrangement was made in ROCK PRODUCTS November 8, 1930.

The plant is located on the north shore of Lake Michigan 22 mi. east of Manistique, and was built to utilize a large deposit of high calcium limestone suitable for fluxing stone and other uses and advantageously located as to water transportation to Chicago and other lake ports. Most of the output will no doubt be normally shipped by boat, although substantial rail shipments are being made throughout northern Michigan and Wisconsin for both chemical and building purposes.

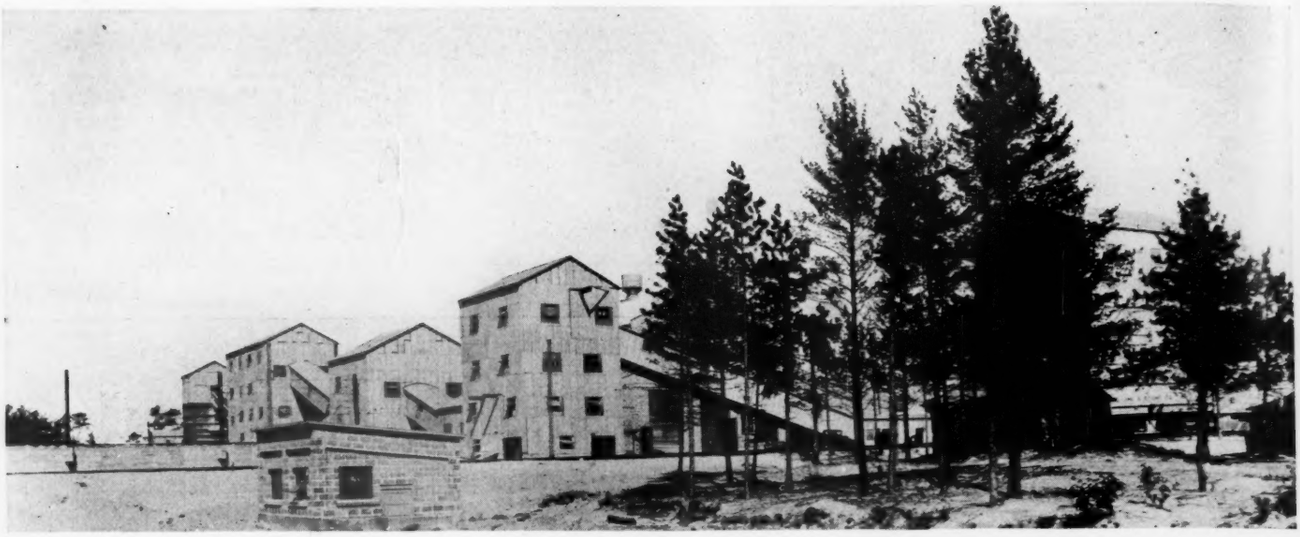
In addition to the crushing plant itself the project included the construction of a railroad 7 mi. long from the quarry to the plant, and the building of a loading and storage dock, with a breakwater for protection while loading.

*Electric quarry shovel and battery of drilling machines*

The operation consists briefly in quarrying limestone with electric shovels, transporting it 7 mi. by electric railway to the crushing and screening plant located on the shore of the lake, storing it in large piles, and loading from there to boats. All handling during crushing, screening, storing and loading is done on belt conveyors, and all sizing is done on roll grizzlies and vibrating screens.

Besides producing open hearth and blast furnace flux, the plant will furnish crushed stone of other sizes for various commercial purposes. Five sizes are being produced at present, namely: open hearth stone, 6 in. to 14 in.; blast furnace flux, 6 in. to 2½ in.; and three commercial sizes, 2½ in. to 1½ in., ½ in. to ⅝ in., and ⅝ in. to ⅛ in. Other sizes can of course be made by a change of screen cloth.

As at the other large plants located on the Great Lakes, the layout includes an open ground storage between the crushing and screening operation and



*General view of buildings of Inland Lime and Stone Co., near Manistique, Mich.*

the loading point, so that the loading of boats is independent of the rest of the operation. In this case the capacity of the crushing and screening plant is 750 tons per hour, while the loading of a boat may be carried on at the rate of about 3000 tons per hour.

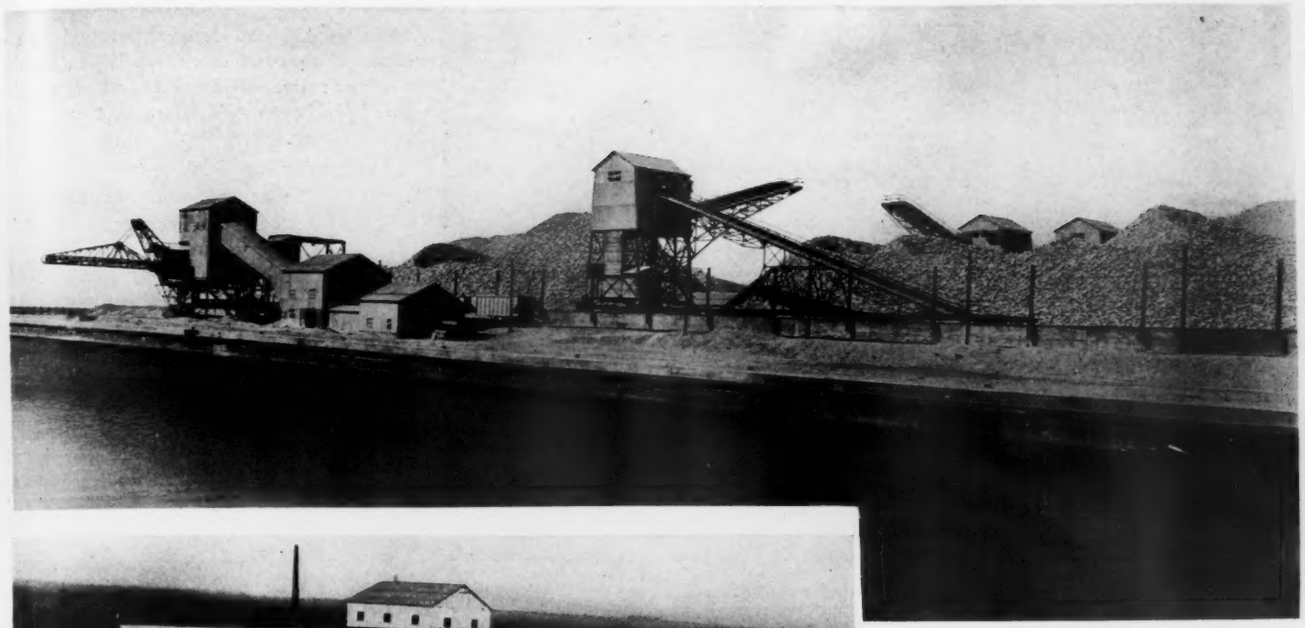
A space 500 ft. wide by 1200 ft. long is used for storage, divided so that there are four longitudinal piles each about 100 ft. wide at the base and 50 ft. high. These storage piles are made by four traveling stackers of original design, and the stone is reclaimed from them by means of belt conveyors in tunnels below the piles. Loading is done from a shuttle belt conveyor extending out over the boat.

The stackers are particularly interesting and have not been used before in a commercial stone plant of this kind. Each stacker unit consists of a longitudinal belt conveyor and tripper arrangement in connection with a cross conveyor, and will be described in more detail under a description of the storage arrangements. The use of electric locomotive cars and trailers for the transportation of the stone from the quarry to the crusher is also unusual and interesting.

The crushing and screening arrangements are somewhat different from usual practice in that instead of being in the same building or in closely connected buildings, each separate operation is carried on in one of a number of smaller separated buildings connected by belt conveyors. In other words, the primary crushing is done in the main crusher building, the scalping in the second building, the recrushing in a third building, and the final screening in the fourth building. Some 30 belt conveyors ranging from 24-in. to 60-in. wide, and aggregating 15,000 ft. in length are used.

All equipment is driven by individual motors through speed reducer units, and arranged for push button control. Stephens-Adamson conveyors, vibrating screens and roll grizzlies are used, with Allis-Chalmers motors throughout, and Falk reducers. The vibrating screens are equipped with SKF ball bearings, while most of the motors and all of the reducers and conveyor idlers are

*Five-yard electric shovel loading rock at the quarry*



*The loading dock*

*Crushing and sizing layout from one of the stackers, showing the scalping house, secondary crusher house and screen house, with the top of primary crusher house in background*

level and with very little overburden, the stripping ranging from nothing up to 2 ft. Its surface is 290 ft. above lake level, with a slight pitch of about 1% toward the southeast and the high calcium deposit is 60 ft. deep.

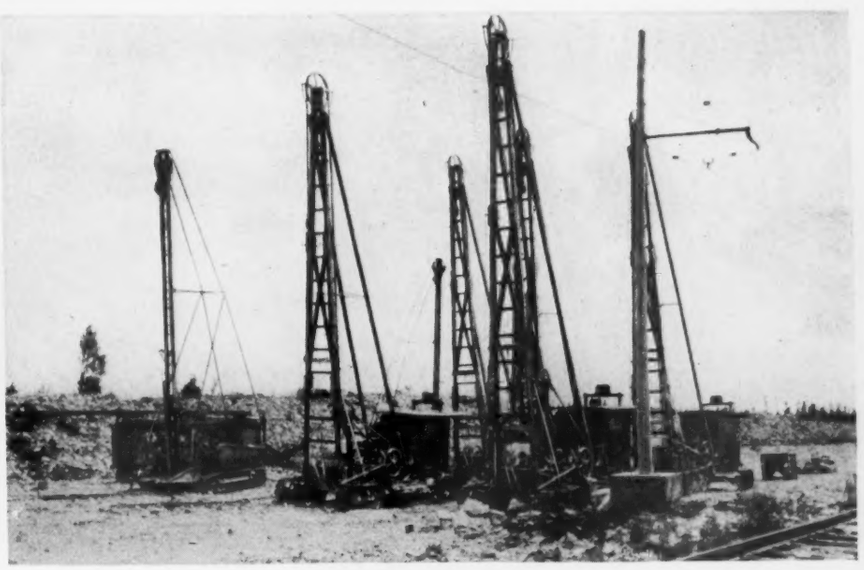
The quarry has been opened up in a straight line about a mile long and has a present maximum depth of about 30 ft. Two main haulage tracks run the entire length of the quarry on a very gradual grade but these tracks are only temporary as the side now used for the railroad grade is to be drilled and shot so as to deepen and widen the cut. The intention is to then go on down until the full 60 ft. of high calcium stone is made available and then work the quarry in one bench 60 ft. deep and about a mile long. No

equipped with Timken roller bearings. Approximately 20,000 Timken roller bearings are used in the whole installation. This almost complete anti-frictionizing of the equipment is interesting as showing the extent to which anti-friction bearings have replaced the old style plain bearings in modern plants. The savings in labor, lubricants, power and maintenance, and the longer and more continuous service obtained from them, would seem to fully justify their use wherever practicable.

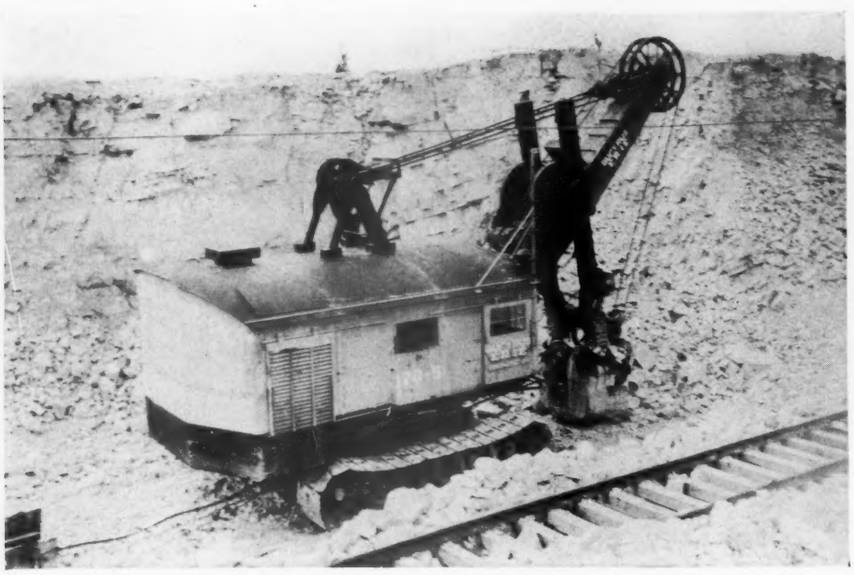
The plant was designed by the Stephens-Adamson Manufacturing Co. of Aurora, Ill.

### *Quarrying and Transportation*

The quarry property, lying 7 mi. north of Lake Michigan in Mackinac county and some 9000 acres in extent, is practically



*Battery of blast-hole drilling machines*



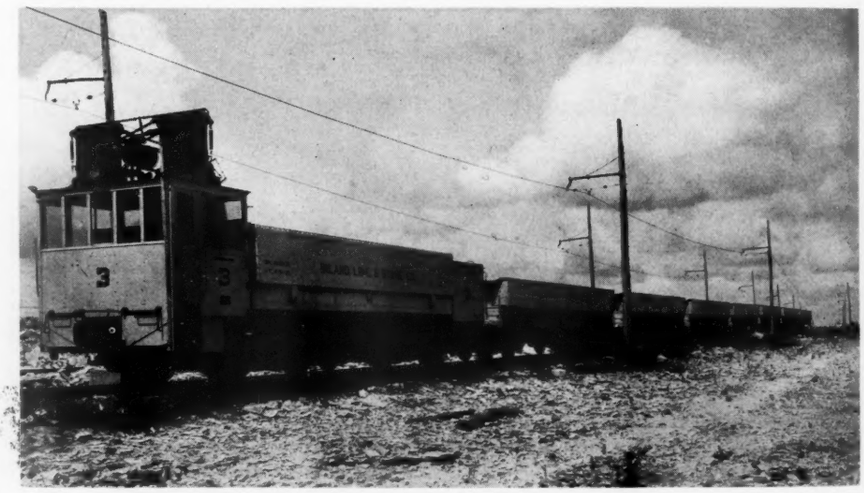
*Electric shovel working in 30-ft. cut*

water enters the quarry from ground seepage, but owing to its large area there is at times a considerable run-off from rains. This is allowed to drain to the center of the cut and pumped out by two small centrifugal pumps.

The stone occurs in strata ranging from 8-in. up to 5-ft. in thickness. The latter stratum does not break as readily as the thinner layers so that some secondary drilling and shooting is nesessary. This work is done in a rather novel way by using a portable air compressor mounted on a standard gage truck. The compressor is driven by a 50-hp. direct current Westinghouse motor which receives its current from the overhead trolley wire serving the haulage system. One wire clamps to the rail while the other wire is hooked over the copper trolley cable by means of a long pole. The compressor is a 10-in. by 12-in. Sullivan and delivers to a 24-in. by 48-in. air receiver mounted on the truck. An oil and water trap is used on the discharge line of the receiver. Ingersoll-Rand jackhammer drills are used for secondary drilling.

In opening up this quarry the largest quarry blast ever made using well drill holes was shot last March. This was described in the April 11 issue of Rock Products and consisted of approximately 2500 holes loaded with 312,000 lb. of Hercules and du-Pont explosives, about 40% being 60% dynamite and the balance 40% dynamite. The holes were drilled about 36 ft. deep and were spaced on 14- to 15-ft. centers in 7 to 9 rows, part of the shot being in the solid rock. Cordeau-Bickford fuse was used and the loading required seven days for 50 men. It was estimated that about 1,500,000 yd. of stone were made available by the blast.

Drilling is done with four Armstrong No. 29 electric motor-driven drilling rigs mounted on crawler treads and five Super-Cyclone No. 14 wood frame drills. These drill 6-in. holes. Three of the Armstrong machines are equipped with wire rope drilling cables and the balance with manila rope.

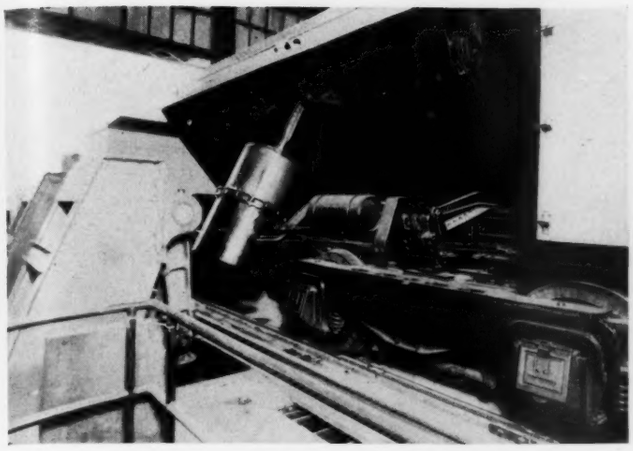


*Electric locomotive car and train for quarry haulage*

*Car unloader in primary crusher house, with arms in extended position*

Excavating and loading is done by two 5-yd. Bucyrus-Erie 170-B full revolving electric shovels on caterpillar treads. Each shovel is equipped with a 350-hp. 2200-volt General Electric motor generator set which has separate generators for hoisting and thrust, and two for swinging.

The rock is loaded to 50-ton capacity side dump steel cars. Four trains are used, each consisting of one Differential electric locomotive car furnished by the Differential Steel Car Co., Findlay, Ohio, and 7 Koppel cars as trailers, each car carrying 50 tons of rock or 400 tons per train. The cars are the drop door side-dump type, each locomotive car being dumped by air from the cab, and the others by a specially designed air operated device located alongside the track



*Dumping arrangement of locomotive car*

*Air-operated car dumper opposite primary crusher*

at the dumping point opposite the primary crusher. Each locomotive car is equipped with four 260-hp. direct-current motors.

This type of locomotive carrying a loading body was decided on as being more efficient and better adapted to the work than the usual type without a body. When handling the loaded train it has a weight of 100 tons, with correspondingly greater traction ability and a weight of 50 tons when returning with the empty train. In that way the loaded locomotive car has plenty of traction ability to move the loaded train, and the empty locomotive car to handle the empty train, thus saving the moving of 50 tons dead weight back to the quarry each trip. At the crushing plant the other cars are dumped first and the locomotive car last, thus retaining its 100 ton rating during the dumping period.

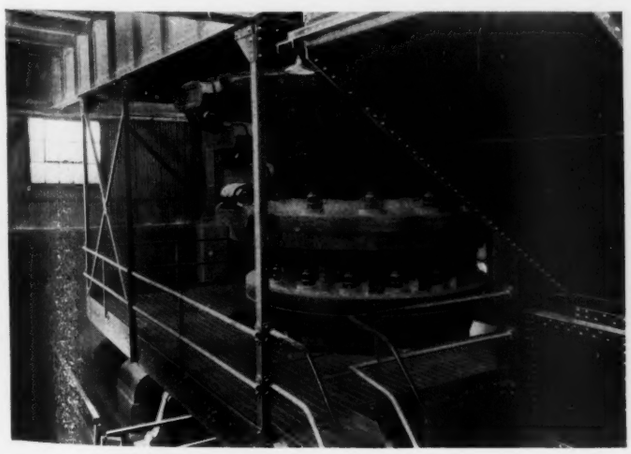
The standard gage railway line connecting the quarry with the crushing plant is of heavy construction with 90-lb. rails on treated oak ties, and with the trolley wire on poles at one side. The manner in which some of these poles are set, particularly those at the quarry, is unusual and interesting. Because of the small amount of soil covering the rock, it would have been necessary to blast holes for them, so instead of doing that they were set in concrete blocks 2 ft. thick and about 2 ft. square which rest on the rock. This made a base heavy enough to keep them in place, with the added advantage that they may be easily picked up and moved to a new position as the track is moved.

*Grizzly at 60-in. primary crusher*

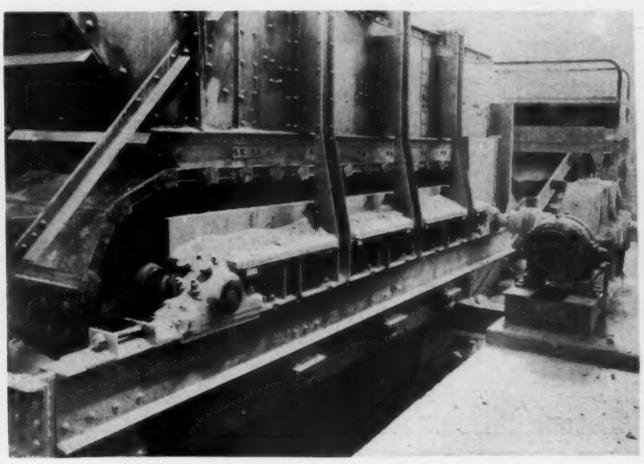
Direct current at 600 volts for the railway operation is supplied by two substations, one at the quarry and one at the crushing plant, each with two 500-kw. General Electric motor generator sets. The substation at the quarry is arranged for remote control so that it may be started and stopped from the one at the crushing plant. At a point about 5 mi. from the crushing plant this line has a connection with the Minneapolis, St. Paul and Sault Ste. Marie railroad.

### *Crushing and Screening*

From the quarry the cars enter the main crusher building on a track above and in front of the primary crusher, and are emptied one at a time by a special dumping arrangement. This device, consisting of two arms actuated by air cylinders, tilts the body of the car and permits the load of stone to slide down over an inclined grizzly to the primary crusher. The operator, stationed on a gallery above the track and with a clear view of the crusher hopper, is able in this way to dump a car every two minutes, or at the rate of 1500 tons per hour.

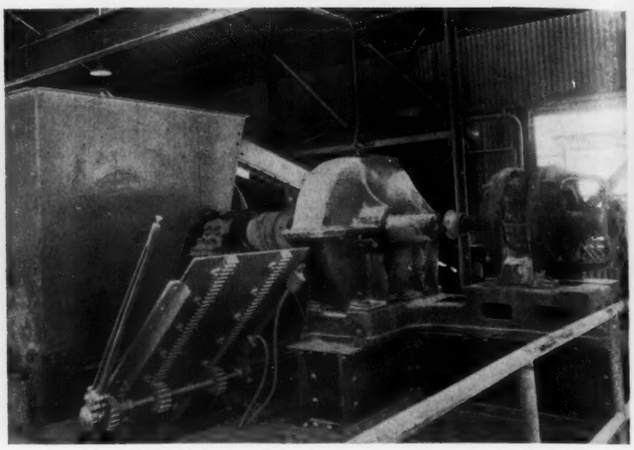


*Upper shell of 60-in. primary crusher and hoppers*



*Pan conveyor feeder for main belt conveyor*

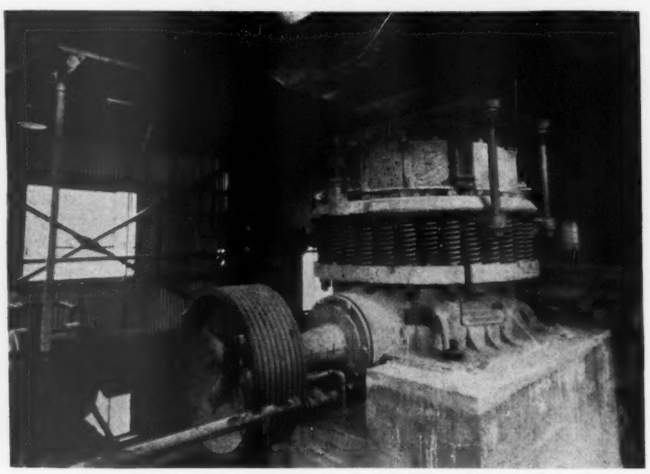
*Loading point of main belt conveyor, showing additional short supporting belt below*



*Ratchet-operated slide gate of unusual design with conveyor drive in background*

The grizzly is made up of 14 steel beams with manganese steel covers, set on a slope of 38 deg. and with 10-in. openings between. The oversize material slides down into the crusher hopper, while the undersize drops to a hopper below and joins the material from the crusher. Both are then fed to the main belt conveyor by an Amsco pan conveyor type feeder below the hopper. This feeder is 48 in. wide by 14 ft. long, with pans of manganese steel specially designed by the American Manganese Steel Co., and is driven at a speed of 40 ft. per min. by a 10-hp. motor through a Falk speed reducer.

At the point where the pan feeder discharges to the main belt conveyor an interesting and worth while feature has been added in the way of a short supporting belt conveyor below the main belt in order to cushion it at that point. This supporting belt conveyor has pulleys about 12 in. in diameter on about 12-ft. centers and is driven by the traction of the main belt. Similar supporting belts were also installed at the feed end of the open hearth main stacker belt and the belt leading to the screen house.



*Cone crusher in secondary crusher house*

The primary crusher is a 60-in. Allis-Chalmers McCulley type gyratory crusher, set to an 8-in. opening, and driven through a Texrope drive by a 250-hp. motor.

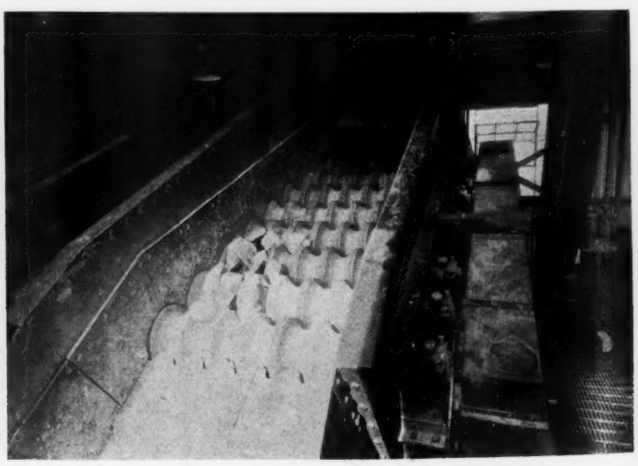
A track hopper with a 10-in. grating also connects with the feeder and main belt so that small sizes may be put through the plant from that point.

From the main crusher building an inclined belt conveyor 48 in. wide by 209 ft. centers carries the material to the scalping building, where it is divided to two live roll grizzlies. Both of these rolls have 6-in. openings and are driven by 20-hp. motors through Texrope drives and speed reducer units.

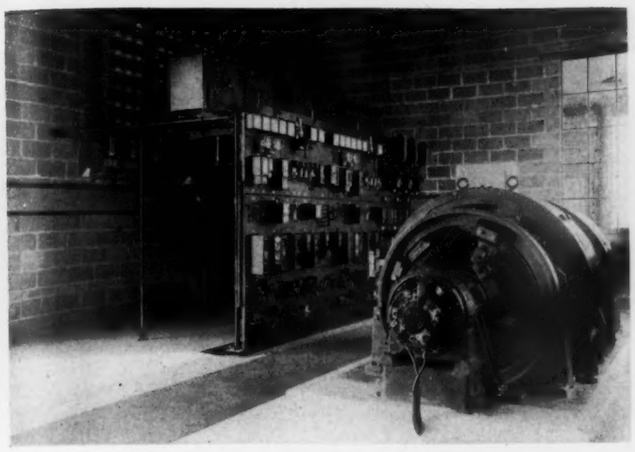
The oversize or plus 6-in. material goes to the first stacker for storage, but can be diverted to another belt conveyor, 42 in. wide by 77 ft. long, carrying to the secondary crusher building for recrushing in a 20-in. Allis-Chalmers McCully type gyratory crusher, if desired.

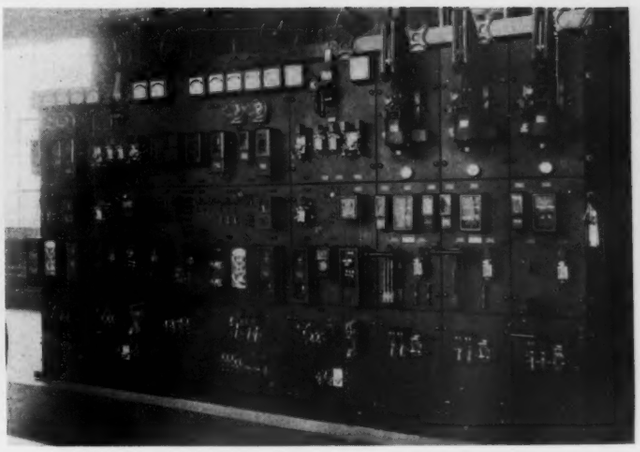
The minus 6-in. material passing through

*Two of the vibrating screens, with belt conveyors in background*



*One of the live roll grizzlies with 6-in. openings, used to scalp stone from primary crusher*





***Switchboard and motor generator set in substation***

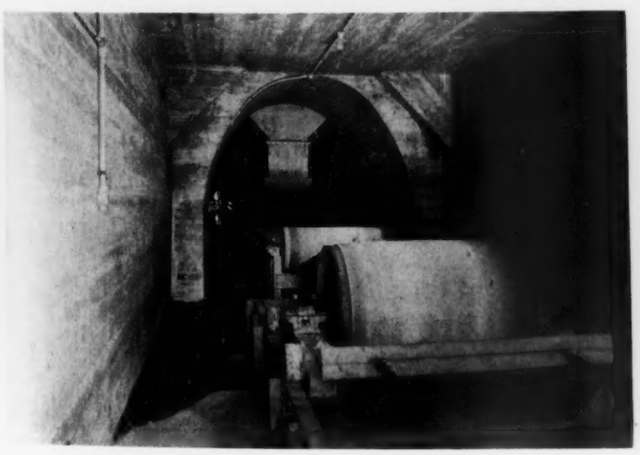
the rolls is carried by belt conveyor to the secondary crusher building, where it is discharged along with the material from the recrushers on to the main belt conveyor passing from the secondary crusher building to the screen house.

The secondary crusher building contains a Symons cone crusher in addition to the 20-in. gyratory crusher, the cone being used to recrush some of the minus 6-in. sizes when returned from the screen house, and the latter to reduce the plus 6-in. size, as just mentioned. Each crusher is driven by a 125-hp. motor through a Texrope drive.

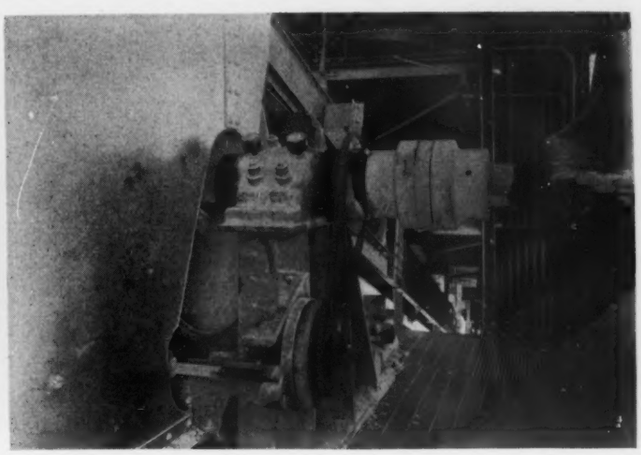
***Hopper equipment below screens***

All material from the secondary crusher building is carried to the screen house on an inclined belt conveyor 177 ft. long and is there divided to two parallel sets of single deck vibrating screens, each set consisting of two screens in tandem, equipped with 2½-in. mesh wire cloth. The oversize, 6 in. to 2½ in., passing over these screens is either delivered to the second stacker for storage or sent back on a belt conveyor 300 ft. long to the Symons crusher for further reduction. The minus 2½-in. material passing through these four screens is carried on two parallel inclined belt conveyors 49 ft. long to two triple deck vibrating screens with 1½-in., ⅝-in., and ⅛-in. mesh wire cloth, and with jets for washing.

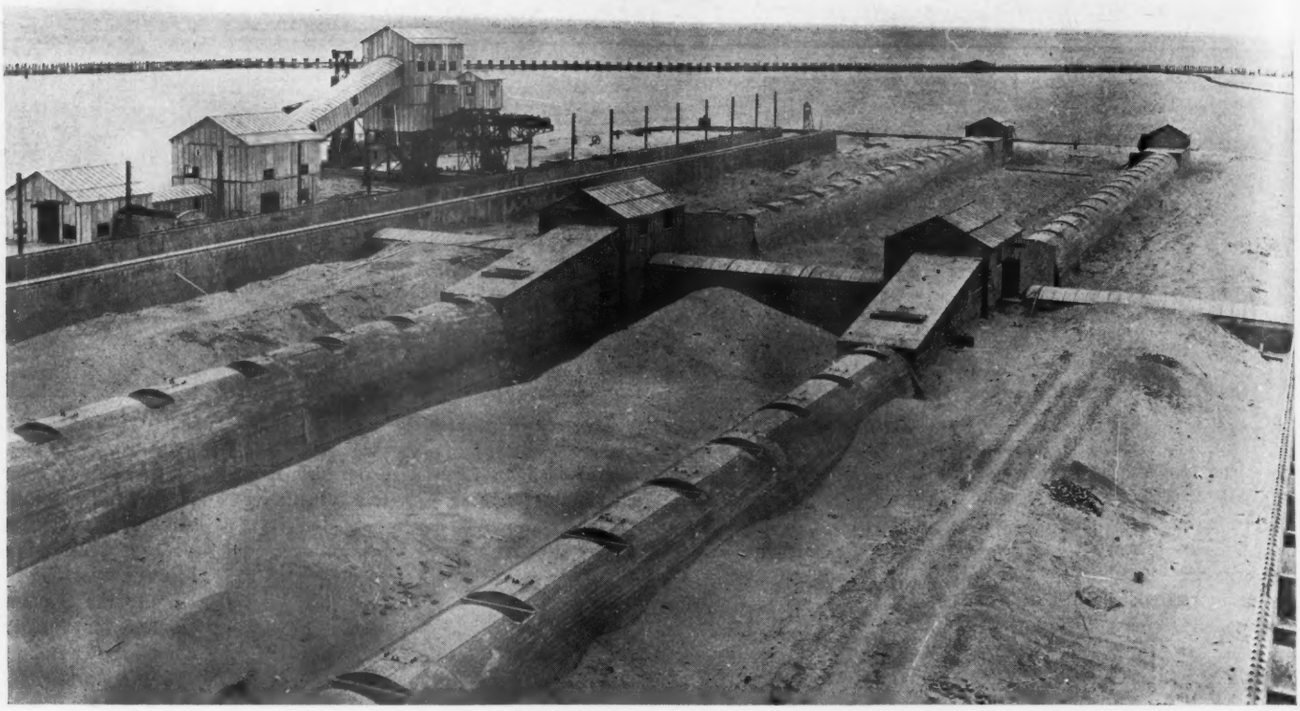
From these screens 2½in. by 1½-in. size may be either conveyed to the third stacker for storage or returned to the Symons crusher. The 1½-in. by ⅝-in. size goes to the fourth stacker for storage, while the ⅝-in. by ⅛-in size is conveyed to a steel storage or



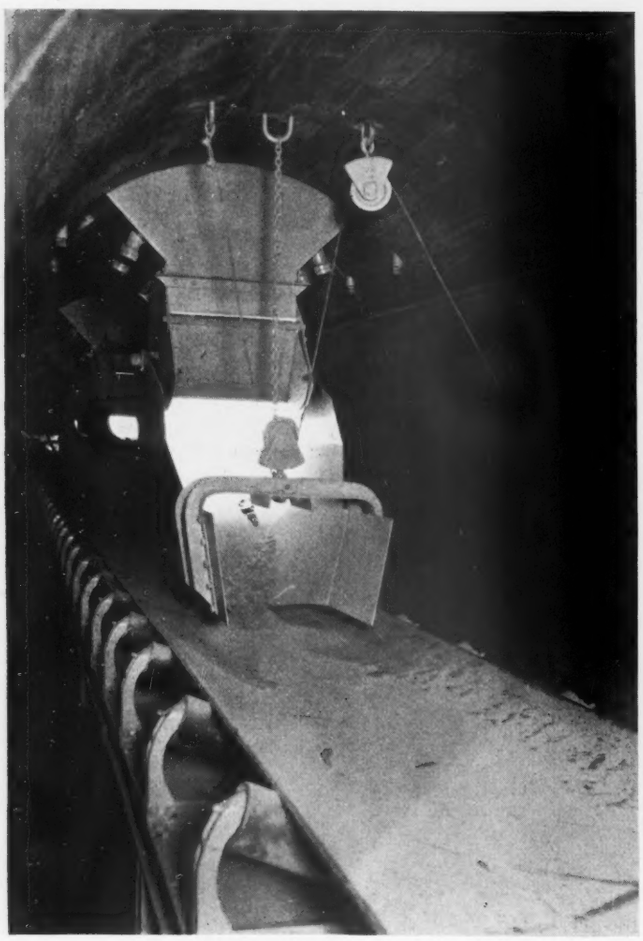
***End of a tunnel conveyor, with snub pulley***



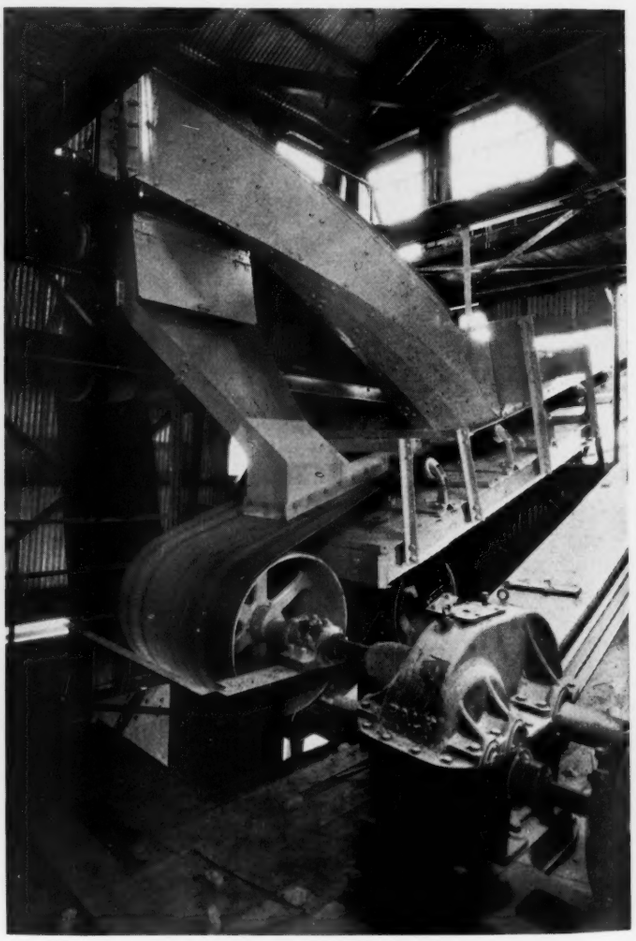
***Conveyor drive and chain-driven brush***



*Two of the concrete tunnels under storage piles, the small houses showing location of main cross conveyor*



*Interior of one of the reclaiming tunnels, showing conveyor and loading gates*



*Chute system to transfer stone from main stacker conveyor to wing conveyor*

surge bin outside of the screen house from which it is later conveyed to the fourth stacker between shifts, or carried by belt conveyor to railroad cars.

The minus ⅛-in. material from the screens flows to a drag flight conveyor where it is dewatered and carried by belt conveyor to cars. This material is marketed as fine aggregates or sand for concrete.

Water for washing is furnished by three DeLaval centrifugal pumps, two 6-in. with 40-hp. motors and one 8-in. with a 75-hp. motor, which deliver to a 10-in. line serving the plant. The smaller pumps each have a capacity of 500 gal. per min. and the larger 1000 gal. per min., or a total of 2000 g.p.m. at 185 ft. head.

### *Storage*

From the screens the sized material is carried out by the four stackers to make the storage piles. These stackers, while similar in principle to the well known belt tripper and belt conveyor, are quite different in arrangement and construction.

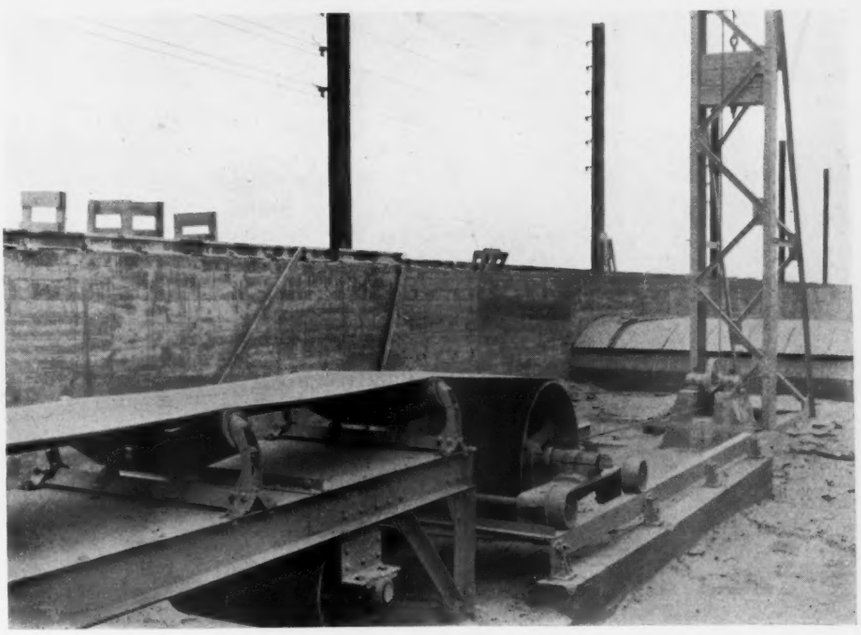
Instead of a conveyor and gallery extending along over the pile, the conveyor is located alongside and passes up through a movable frame or tower where the material is discharged, tripper-fashion, to a cross conveyor at right angles to the main conveyor and carrying the material to a point above the center of the pile. The main belt, after delivering its load to the cross belt at the top of the tower, continues down and along the track to the tail pulley and then back on return idlers to the feeding point. By means of a counterweight and cables attached to the tail pulley frame a uniform tension is maintained in the main belt.

The cross conveyor frame extends out 60 ft. from the tower and supports an inclined belt conveyor 97 ft. long, the weight of this being compensated for by a counterweight on the opposite side of the tower. The tower containing the cross conveyor is movable at a speed of 50 ft. per min. on the track alongside the pile, and is driven by a 40-hp. motor with solenoid brake. In addition to this brake to hold the tower against any movement or drifting when not being shifted, each truck frame has heavy dogs which engage slots in the wheels, and which may be thrown in or out from the tower.

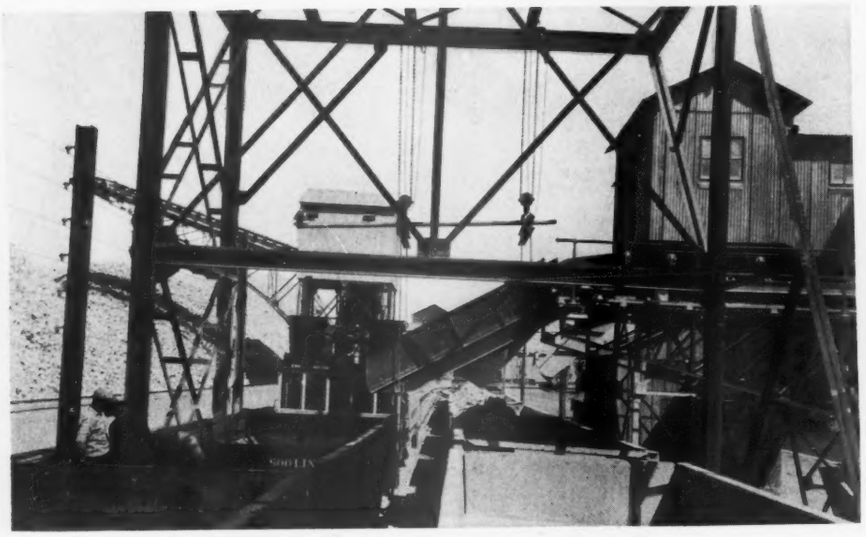
In this way each stacker, consisting of a main belt conveyor, tower and cross belt, functions as a tripper to build a storage pile. The storing operation is then as follows: The first stacker piles open hearth stone, 6-in. to 14-in. in size, direct from the scalping grizzlies to the first storage pile. The second stacker takes the flux stone, 2½-in. to 6-in. in size, from the screen house to the second storage pile. The third stacker takes the largest commercial size, 1½-in. to 2½-in., from the screen house to the third storage pile. The fourth stacker takes care of the other two commercial sizes in the following manner. From the screen house the ⅜-in by 1½-in. size is carried by belt

***Two stackers and tunnel for reclaiming conveyor***

***Looking between storage piles at two of the stackers***



***End of a stacker conveyor, showing gravity belt tension device***



*Grizzly used in cleaning railroad shipments*

*Group of three stackers*

*Stacker running gear, showing dog and slot arrangement used to prevent drifting*

conveyor to a storage pile. The last, or ⅛-in. by ⅝-in. size, is carried by belt conveyor from the screen house to a storage or surge bin holding a day's run, and from there to the stacker by another belt. In this way the ⅝-in. by 1½-in. size and the ⅛-in. by ⅝-in. size are handled and piled intermittently by one stacker. These stackers have worked out satisfactorily and are said to be more economical than the ordinary A-frame gallery construction. The concrete walls supporting the stackers act as retaining walls to increase the effective storage. The open hearth and flux stone piles have a live storage capacity of about 40,000 tons each and the commercial sizes 10,000 to 20,000 tons.

### *Reclaiming and Loading*

From storage the stone is reclaimed by means of belt conveyors in tunnels below the piles. Under each pile is a concrete tunnel 400 ft. long containing one 48-in. by 370-ft. belt conveyor, which carries to a cross conveyor at the center of the pile.

The openings in the roof of the tunnel are spaced about 20 ft. apart and are arranged with feed gates of the hinged type, which are opened by lowering and closed by raising. The longitudinal 48-in. conveyors are speeded to have a capacity of about 1500 tons per hour, while the cross conveyor, 60 in. by 487 ft., is run at a speed of 500 ft. per min. to carry 3000 tons per hour and handles material from both longitudinal conveyors.

The cross conveyor, carrying out toward the loading dock, discharges to an inclined conveyor 60 in. wide by 160 ft. long which is parallel to the dock. This in turn feeds the shuttle loading conveyor, 60 in. wide by 105 ft. long. The latter conveyor is at right angles to the edge of the loading dock and is mounted on a movable tower which is motor driven and is moved in or out on a track to spot the loading conveyor. The conveyor itself is supported on a framework arranged so that the overhanging half of it on the water side may be lowered into the ship's hold at an angle of 25 deg., thus reducing the amount of breakage during loading. The inclined conveyor is provided with a Merrick Weightometer for automatically weighing the stone as it passes on the belt.

The 60-in. by 487-ft. cross conveyor which receives stone from the tunnels is driven by a 125-hp. motor and the 60-in. by 160-ft. inclined conveyor by a 250-hp. motor.

The larger stone is passed over a screen just before it is delivered to the shuttle conveyor in order to screen out any fines which may have been made during the storing and reclaiming operations.

Arrangements are also made for loading to railroad cars, this being done by reversing the direction of the shuttle conveyor so that it discharges over a bar grizzly suspended above the cars. Any fines resulting from breakage during storage and reclaiming are thus passed through the grizzly and spouted to a railroad car below, while the

*Loading boom and frame on dock*

cleaned material falls to a car on the track alongside. The fines are returned to the plant by way of the track hopper at the primary crusher.

### General

Among the other features of interest is the breakwater, which was built to protect the vessels while loading. This has a total length of about 3600 ft., and some 250,000 tons of the dolomite rock near the plant were used in its construction.

The loading and storage dock is about 900 ft. long by 600 ft. wide, and is mostly of concrete with sand filling. A 22-ft. channel was dredged in to it.

Electric power for the plant is furnished by the Cliffs Power and Light Co. over a 100-mile transmission line at 60,000 volts.

Particularly worthy of note are the control features and the electrical installation, as the most advanced methods and equipment have been used throughout. The controls for all motors from the roll grizzlies to the last stacker are centralized at one point and connected for automatic starting in a sequence opposite the flow of material. That is, the last stacker starts first and the grizzlies last, at 30 second intervals, the whole sequence taking 5 to 6 min. to complete. They are stopped in the same manner but in the reverse order. The controls for the primary crusher end of the plant are centralized in the same way, the conveyor to the grizzlies starting first, then the feeder, and then the primary crusher. As a result of these features it is impossible to cause a choke up from improper starting or stopping of the equipment. Also in event of failure or stopping of any unit all units feeding material to it are also automatically stopped.

Details of construction have been carefully worked out, feed hoppers being arranged as stone boxes wherever possible so that the stone wears on itself. All other spouts are provided with manganese steel liner plates.

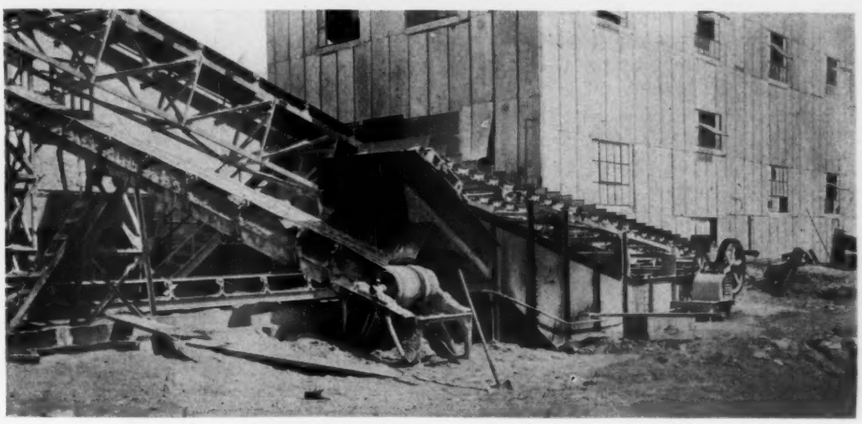
A large shop building served by a 50-ton Whiting overhead crane and by railroad tracks contains a complete installation of tools capable of handling work of any size. The power substation and main switches as well as the warehouse or supply room are also housed in this building.

Considering its size and the tremendous amount of work involved, as well as the location and construction difficulties and the fact that everything had to be built new from the ground up, the whole project was completed in remarkably short time.

*Auxiliary bins for smaller sizes with sand-dewatering conveyor in foreground*

### Personnel

The executive offices of the company are in the First National Bank Building, Chicago, Ill., with other offices at Manistique and at the plant. The officers are: Clarence B. Randall, president; Wilfred Skyes, assistant to the president; George J. Nicholson, vice-president; Gordon W. Hughes, sales manager; W. D. Truesdale, secretary-treasurer; J. H. Morris, assistant secretary; W. Moon, assistant treasurer; A. J. Cayia, superintendent; and A. W. Heitman, assistant superintendent.



*Sand-dewatering conveyor discharging to belt*

# Researches on the Rotary Kiln in Cement Manufacture*

## Part XXVIII—The Design of Waste-Heat Boilers for Rotary Cement Kilns

By Geoffrey Martin

D.Sc. (London and Bristol), Ph.D., F.I.C., F.C.S., M. Inst. Chem. Eng., M. Inst. Struct. Eng., M. Soc. Pub. Analysts, F. Inst. Fuels; Chemical Engineer and Consultant; Former Director of Research of the British Portland Cement Research Association; Author of "Chemical Engineering"

**Synopsis**

***A DESCRIPTION is given of recent improvements in heat transmission through tubes, whereby the efficient recovery of waste heat has been made possible under circumstances formerly regarded as presenting insuperable difficulties.***

THE STEADILY INCREASING COST of fuel has caused the attention of industrialists to be directed to an increasing extent to the recovery of waste heat from furnaces.

The writer during recent years has been engaged in carrying out much elaborate engineering research work on boiler design for the efficient recovery of waste heat from furnaces (with special reference to wet process cement kilns with exit temperatures of 700 deg. to 800 deg. F.). An account of the results attained must be interesting to all manufacturers who possess furnaces from which hot gases escape thermally unutilized.

The practical upshot of this research work was to show that such hot gases could be economically utilized to a far greater extent than has hitherto been deemed possible by our manufacturers. The scientific result was to uphold the validity of the film theory of thermal resistance, first put forward by Osborne Reynolds in 1874, and later extended by the recent brilliant research work of Langmuir, Fry, Jordan, Nusselt and other workers in America, whose researches must be regarded as of an epoch-making character from the point of view of the steam engineer.

It is now established beyond question that, by taking advantage of these recent technical advances, waste-heat boilers have been erected of an efficiency far exceeding anything generally thought possible. It is possible to use them economically with exit gases issuing at temperatures as low as 600 deg. F., and when employed in some types of furnaces they will yield more than enough power to run the whole of the works. Dirty and dusty flue gases present no terrors for a properly designed waste-heat boiler of this type. They need practically no attention, but run month after month, with monotonous regularity.

### *Systems of Waste-Heat Recovery*

Before proceeding to describe the means whereby these recent technical advances have been achieved it will be advisable to give an account of the usual methods employed in waste-heat recovery.

Two main systems are in use today, namely: (1) the water-tube system, and (2) the fire-tube system.

1. *Water-Tube System.* In boilers of this type tubes full of water are immersed slantwise in a chamber through which the hot flue gases pass. The water in the tubes is thereby heated to the boiling-point, and owing to the slanting position of the tubes, the hot water immediately rushes through the tubes into a reservoir above them and raises the mass of water therein to boiling.†

2. *The Fire-Tube System.* In this system the waste flue gases are caused to traverse pipes of relatively narrow bore running through a boiler.

The principle of the fire-tube waste-heat boiler is that of the well-known locomotive boiler, which has been worked successfully since the time of George Stephenson over a century ago. So that no novelty as regards principle can be claimed for this type of boiler. Nevertheless, this ancient boiler, when used for waste-heat recovery, can be so designed and so worked as far to exceed any other known type of boiler as regards thermal efficiency, simplicity of operation, and cheapness of installation.

This is due to the fact that advantage can be taken of the increased heat transmissibility attained by causing the hot gases to traverse the pipes at great speed. To see this needs a brief discussion of the results of modern research on heat transmission.

### *Comparison of the Water and Fire Tube Systems for Heat Recovery*

As regards the *fire-tube system*, the peculiar advantages it presents are as follows:

1. The gases can be sent through the tubes at a very great speed of 80 to 100 miles per hour, thereby reducing the thickness of the gas film adhering to the steel surfaces to very small dimensions and thus effecting an extremely efficient heat transfer.

2. The plant is very simple and much cheaper to install and work than the water-tube system.

3. The plant needs practically no attention, working year in and year out with the greatest regularity and efficiency.

4. The great speed of the gases through the fire-tubes keeps dust from depositing in them. The plant is therefore particularly successful in cement works and similar works where dirty flue gases are a feature.

5. Cold air leakages can be completely avoided.

The disadvantage of the fire-tube system is that very large units are difficult to construct on account of the shell thickness required.

*Water-Tube System.* The disadvantages of the *water-tube system* for waste-heat recovery are obvious:

1. The relatively slow velocity of the flue gas over the boiler tubes does not destroy the thermally resisting gas film. Hence the heat transmission is bad as compared with the fire-tube system.

2. It follows that a very large heating surface is necessary to secure the requisite heat transmission. This makes the plant much larger and more expensive to install than the fire-tube system.

3. With dusty flue gases continual cleaning and great attention are necessary to secure efficiency.

4. Cold air leakage is difficult to prevent. If much fan draught is put on the boiler, the brick setting leaks and allows the entry of much cold air. This reduces the quantity of steam produced, and adds uselessly to the volume of the products and consequently to the power absorbed by the fan.

There can therefore be no doubt that, so

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†Illustrations and descriptions of specific waste-heat boilers are omitted here, as ROCK PRODUCTS readers are no doubt familiar with American types.

far as waste-heat recovery is concerned, a fire-tube system is economically a better proposition than a water-tube system.

### *Effect of Gas and Water Films on Heat Transfer*

In most systems of waste-heat recovery the heat is transmitted from the hot flue gases, through a steel boiler wall, to the water, as indicated in Fig. 1. The heat flows mainly by conduction, radiation playing only a small part in the process owing to the low temperature of the waste gases and the poor radiating power of hot gases.

It has been proved that a stationary film of gas, $MNPQ$, adheres firmly to the side

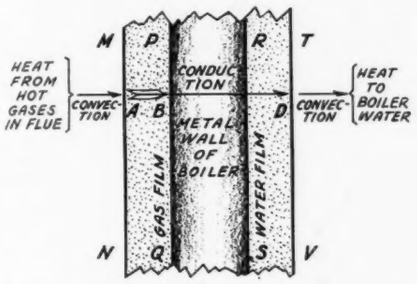



***Fig. 1. Method of heat travel through waste-heat boiler wall***

of the steel wall which is in contact with the hot flue gas, while a stationary film of water, $RSTV$, coats that side of the steel plate which is in contact with the water. These films are caused by the intense molecular attraction of the molecules forming the boundary walls of the steel plate for the surrounding gaseous or fluid molecules.

The thickness of the films ranges from 1/16 to 3/16 in. Their effect is to coat the steel plate with two non-conducting layers, which impede enormously the passage of heat through the walls from flue gas to water. In fact, the thermal resistance of the gas and water films so immensely exceeds that of the metal wall that the effect of the latter is quite negligible.

This is evident from the fact that the thermal conductivities ($k$) of the various layers are as follows:

| | CONDUCTIVITY ($k$) |
|---|---|
| Air film | 0.014 B.t.u./hr./sq. ft./deg. F./ft. thickness |
| Water film | 0.340 B.t.u./hr./sq. ft./deg. F./ft. thickness |
| Steel plate | 25.000 B.t.u./hr./sq. ft./deg. F./ft. thickness |

Since the thermal resistances are the reciprocals of the thermal conductivities, it follows that the thermal resistances of equal thicknesses of the three layers work out as 1703:24:1. Consequently, the air film opposes a resistance to the flow of heat no less than 24 times that of a film of water of equal thickness, and 1703 times that offered by an equally thick metal wall.

In other words, the only influence arresting the flow of heat which the practical engineer need consider is the air film. It is necessary to go into some detail on this matter.

### *Formula for Calculating Flow of Heat Through a Compound Wall*

Consider a wall composed of an air film, a steel wall, and a water film, as shown in Fig. 2.

Let $t_1$, $t_2$ $t_3$, $t_4$ be the temperatures in deg. F. of the successive faces of the air film, metal wall and water film, as indicated in Fig. 2.

Let $d_1$, $d_2$, $d_3$ be the thickness of each layer in feet.

Let $k_1$, $k_2$, $k_3$ be the thermal conductivity of each layer in B.t.u.'s/hr./sq. ft./deg. F./ft. thickness.

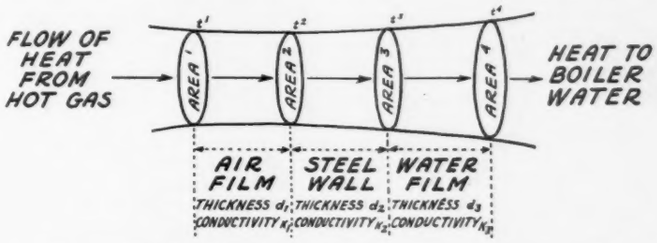



***Fig. 2. Showing how heat flows through a compound wall***

Let $r_1$, $r_2$, $r_3$ be the thermal resistance* of each layer and $R$ that of the compound wall composed of these layers.

Let $A_1$, $A_2$, $A_3$, $A_4$ be the successive cross-sectional areas of each layer through which the same quantity of heat, $Q$ B.t.u.'s, flows in the same time, $\theta$ hours.

The thermal force or pressure driving this quantity of heat, $Q$, in succession through each layer of the compound wall, against its thermal resistance $r$, is the *temperature difference* which exists on the two sides of each layer. The flow of heat follows the same laws as electrical flow or the flow of a fluid through a pipe.

Hence:

$$\text{rate of heat flow across each layer} = \frac{\text{thermal driving force across layer}}{\text{thermal resistance of layer}},$$

or

$$\frac{Q}{\theta} = \frac{t_1 - t_2}{r_1} = \frac{t_2 - t_3}{r_2} = \frac{t_3 - t_4}{r_3} \quad \ldots \quad (1)$$

hence

$$\frac{Q}{\theta} = \frac{(t_1 - t_2) + (t_2 - t_3) + (t_3 - t_4)}{r_1 + r_2 + r_3}$$

or

$$\frac{Q}{\theta} = \frac{t_1 - t_4}{r_1 + r_2 + r_3} \quad \ldots \quad (2)$$

or

$$\frac{Q}{\theta} = \frac{t_1 - t_4}{R} \quad \ldots \quad (3)$$

The thermal resistance, $R$, of the compound wall is the sum of the individual resistances $r_1$, $r_2$, $r_3$ of the successive layers composing the wall. Further, each individual resistance, $r$, is proportional to the thickness, $d$, of the layer, and inversely proportional to the cross-sectional area, $A$, of the path through which the heat flows and inversely as the specific thermal conductivity of each layer which makes up the wall.

Hence

$$r_1 = \frac{d_1}{A_1 k_1} \quad r_2 = \frac{d_2}{A_2 k_2} \quad r_3 = \frac{d_3}{A_3 k_3} \quad \ldots \quad (4)$$

and

$$R = r_1 + r_2 + r_3 = \frac{d_1}{A_1 k_1} + \frac{d_2}{A_2 k_2} + \frac{d_3}{A_3 k_3} \quad (5)$$

Substituting this value of $R$ in (3), we get

$$\frac{Q}{\theta} = \frac{t_1 - t_4}{\frac{d_1}{A_1 k_1} + \frac{d_2}{A_2 k_2} + \frac{d_3}{A_3 k_3}} \quad \ldots \quad (6)$$

From this formula most practical problems relating to the flow of heat through a compound wall can be solved.

### *Practical Application of Formula to Waste-Heat Boiler*

Now let us apply formula (6) to the practical case of a *waste-heat boiler*.

Make $A_1 = A_2 = A_3 = A_4 = 1$ sq. ft.

Substitute the conductivities:

For air film, $k_1 = 0.014$ B.t.u./hr./sq. ft./deg. F./1 ft. thick.

For steel boiler plate, $k_2 = 25.000$ B.t.u./hr./sq. ft./deg. F./1 ft. thick.

For water film, $k_3 = 0.34$ B.t.u./hr./sq. ft./deg. F./1 ft. thick.

Let $d_1$. $d_2$, $d_3$, be the thickness (in feet) of the air film, steel plant, and water film successively, and $t_1$ the temperature of the *flue gas* and $t_4$ the temperature of the *boiler water* in deg. F.

Then we get by substituting in (6)

*B.t.u.'s* transmitted per hour per square foot of heating surface

$$= \frac{t_1 - t_2}{\frac{d_1}{0.014} + \frac{d_2}{25.00} + \frac{d_3}{0.34}},$$

or B.t.u.'s/hr./sq. ft./

$$= \frac{t_1 - t_2}{71.4d_1 + 2.94d_2 + 0.04d_3} \quad (7)$$

From this formula we can calculate the heating surface required to produce a given supply of steam, provided we know the tem-

*Unit thermal resistance is that resistance which allows a unit quantity of heat to flow in unit time through a unit area when a unit difference in temperature is maintained across a unit thickness. The thermal resistance is the reciprocal of the thermal conductivity.

TABLE I—EFFECT OF REDUCTION IN THICKNESS OF GAS FILM

| Thickness of gas film | 0.1 in. | 0.05 in. | 0.01 in. | 0.001 in. | 0.0001 in. | Zero |
|---|---|---|---|---|---|---|
| B.t.u.'s transmitted per 1 sq. ft. of heating surface per hour per 1000 deg. F. temperature difference..... | 1610 | 3090 | 11,682 | 31,250 | 37,453 | 38,314 |

perature of the flue gas and the thickness of the various films which coat the boiler plate.

In a practical case let $t_1 - t_2 = 1000$ deg. F.

For the air and water film let the thickness $d_1 = d_3 = 0.1$ in. $= 0.00833$ ft.

For the boiler plate let the thickness $d_2 = 0.5$ in. $= 0.0417$ ft.

Then (7) becomes

$$\text{B.t.u.'s/hr./sq. ft./} = \frac{1000}{0.5950 + 0.0244 + 0.0017} = 1610 \text{ B.t.u.}$$

*The main influence stopping the flow of heat is the resistance of the gas film. A long way behind this in potency is the water film, while of quite negligible importance is the thickness and nature of the metal enclosing the water.*

### Increase of Efficiency Caused by Reducing the Thickness of the Gas Film on the Boiler Plates

It is not possible to reduce the thickness of the gas film to zero. It is, however, possible to reduce its thickness very considerably. The accompanying table shows what an enormous effect the reduction of the thickness of the gas film has on increasing the flow of heat from the flue gases into the water per square foot of heating surface.

Reducing the thickness of the gas film by one-half increases the flow of heat by nearly 100%. By reducing the thickness of the gas film to one-tenth its original amount, we increase the flow of heat by over 600%, and by reducing the thickness to one-hundredth of its original amount we increase the flow of heat from 1610 to 31,250 B.t.u. per sq. ft., or by nearly 2000%.

The effect of reducing the thickness of the water film is negligible in comparison with the effect of reducing the gas film:

TABLE II—EFFECT OF REDUCING THICKNESS OF WATER FILM

| Thickness of water film | B.t.u.'s transmitted per square foot of heating surface per hour per 1,000 deg. F. temp. difference |
|---|---|
| In. | |
| 0.1 | 1610 |
| 0.05 | 1642 |
| 0.01 | 1669 |
| 0.001 | 1675 |
| 0.0001 | 1676 |

Reducing the thickness of the water film to one-half its original thickness only increases the flow of heat by 2%, and reducing the thickness to one-thousandth part of the original thickness merely increases the flow of heat by 4%. Reducing the thickness of the metal shell of the boiler to zero merely increases the flow of heat by 0.25%—a perfectly negligible amount.

Hence we now see what we must do in order to increase the efficiency of a waste-heat boiler. *We must reduce the thickness of the gas film covering the steel boiler plate to the smallest practical dimensions possible.*

### Method of Reducing the Thickness of the Gas Film by Increasing the Speed of Gaseous Flow Over the Boiler Plate

We have just seen that the predominant influence checking the flow of heat into the boiler water from the flue gas is the presence of a gas film. We have also shown that even a slight reduction in the thickness of this film enormously increases the efficiency of the boiler by increasing the transmission of heat.

The problem now is, How are we to reduce the thickness of this gas film? The answer is: By increasing the speed of gaseous flow over the metal surfaces. By this means we tear away many of the molecules of the gas adhering to the metal, and thus reduce the thickness of the stationary gaseous layer.

Let us consider this effect in greater detail. Consider a gas flowing along a steel

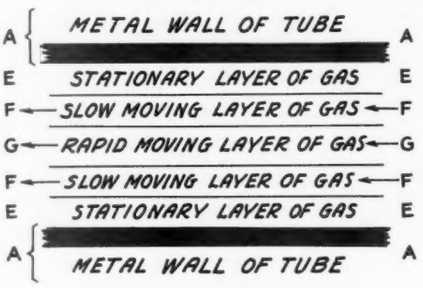



**Fig. 3. Passage of flue gas through boiler tube**

boiler tube *AAAA* (Fig. 3). The gas sorts itself out into different layers moving at different speeds. In the center occurs a core of gas (*GG*) moving at the maximum speed. Surrounding it occurs a more slowly moving layer *FF*. Along the sides is a layer of stationary molecules, forming the heat-resisting gaseous film.

The gaseous molecules attract each other. Consequently, one layer of molecules moving rapidly over another tends to pull or drag the slower moving molecules along with them. The more rapid the motion of the gaseous layer, the more pronounced is this dragging action. The more rapidly the gas flows down the pipe, the greater will be the relative motions between the stationary layer *EE* and the next layer *FF*, and consequently the more pronounced will be the tendency of the layer *FF* to pull away and set in motion the stationary layer *EE*. It is therefore obvious that the movement of furnace gases over the heating surface tends to destroy or make thinner the gas film clinging to the plates, and the greater the velocity of the gas, the thinner the gas film.

We should therefore expect that increasing the speed of gas through a fine tube will greatly increase the rate of heat transmission through such a tube. Experiment has confirmed this.

In 1844 Peclet pointed out the existence of a water film ("Traité de la Chaleur," chap. viii., p. 13). In 1874 Osborne Reynolds (*Proc. Man. Lit. and Phil. Soc.*, 1874, p. 9) published an epoch-making paper, in which he put forward the idea that the transmission of heat depended upon the speed of the gas. Stanton (*Phil. Trans. Roy. Soc.*, vol. 190, p. 67) and Nicholson confirmed this work.

In 1912 Langmuir, in America, began to publish his remarkable researches on gas films and the effect of velocity upon the thickness of the film and upon heat transfer (*Phys. Review*, **34**, p. 421; *Trans. Amer. Electrochem. Soc.*, **23**, 299, 1913). He demonstrated by means of a delicate thermocouple that on a hot silver plate between 150 deg. and 500 deg. C. an air film of 4 mm. existed.

The work was continued in America, and an extremely important series of researches has been published there within the last few years which has settled the question, so far as ordinary engineering is concerned, of the heat transfer of flue gases to boiler water.*

### Lolog Formulae for Heat Transmission

As this work is so fundamentally important, I will give a brief account of it.

The preceding authors had clearly established the fact that when hot flue gases pass down a boiler tube the heat transmission in B.t.u.'s into the water per unit of time and per unit of heating surface is not the same for each unit of tube length.

The curve (Fig. 4) shows this. The ordinates represent the amount of heat remaining in each lb. of waste gases for each unit length along the tube. The temperature difference between the water in the boiler and the waste gases is larger at the commencement of the tube than at the end of

*The main references are: Wm. Nusselt, *Verein Deutsche Eng.*, **89**, 1910. Fessenden and Haney, *University of Missouri, Bull.*, **17**, No. 26 (1916). H. P. Jordan, *Proc. Inst. Mech. Eng.*, 1909. Fry, *Trans. A. S. M. E.*, 1917.

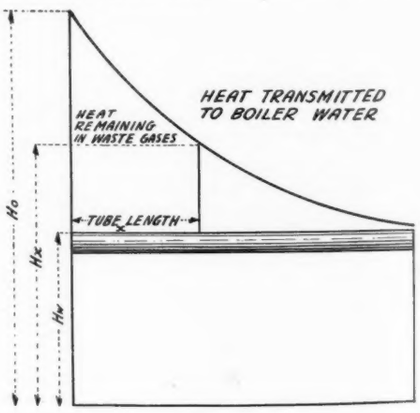



**Fig. 4**

the tube. This causes a much greater amount of heat to be transmitted into the water in the earlier parts of the tube than towards its end. Thus by the time one-half of the tube has been traversed the gas has yielded up to the water about 75% of its available heat.

Professor Hedrick showed that the loss of heat from a gas traveling down a flue is given accurately by the expression:—

$$\text{Log } H_x = c \cdot e^{-} \quad \ldots \ldots \quad (8)$$

or

$$-\frac{dH_x}{dx} = cmH_x e^{-mx} \quad \ldots \ldots \quad (9)$$

where $x$ is the length of the tube traversed by the gas, $c$ and $m$ are constants, and $H_x$ is the quantity of heat (reckoned from absolute zero) remaining in the gas after it has traversed the length $x$, while $e$ is the Napierian base of logarithms.

The physical significance of this is that the heat in the gas is imparted to the water at a rate which diminishes exponentially as the distance $x$ increases down the tube, but at any one particular distance $x$ the rate is directly proportional to the quantity of heat $H_x$ left in the gas, as reckoned from absolute zero.

This formula may be applied practically to boiler design as follows:—

Let $H_0$ = absolute quantity of heat (in (B.t.u.'s) contained in 1 lb. of gas (reckoned from absolute zero) as it enters the boiler tube ($x = 0$).

$H_x$ = absolute quantity of heat (in B.t.u.'s) remaining in 1 lb. of gas (reckoned from absolute zero) after it has traversed a length $x$ ft. of boiler flue.

H = absolute quantity of heat (in B.t.u.'s) contained in 1 lb. of gas (reckoned from absolute zero) when its temperature reaches the temperature of the water in the boiler.

Then in (8) let $x = 0$ and $e^{-mx}$ becomes $= 1$ and log $H_0 = C$.

So that C is the quantity of heat (reckoned from absolute zero) contained in 1 lb. of gas as it enters the tube ($x = 0$).

Then (8) becomes

$$\text{Log } H_x = (\log H_0)\, e^{-mx} \quad \ldots \quad (10)$$

Now the practical conditions of the problem require that when the tube is infinitely long ($x = \infty$) the temperature of the gas ultimately reaches that of the surrounding water, and therefore $H_x \rightarrow H_w$ as $x \rightarrow \infty$.

Hence, divide (10) by log $H_w$ and we get

$$\text{Log}\frac{H_x}{H_w} = \log\frac{H_0}{H_w} e^{-mx} \quad \ldots \quad (11)$$

Equation (11) satisfies all the practical boundary conditions because $x = \infty$ gives $e^{-mx} = 0$,

giving

$$\text{Log}\frac{H_\infty}{H_w} = 0 \text{ or } H_w = H_\infty,$$

and

$$x = 0 \text{ gives } e^{-mx} = 1$$

giving the identity

$$\text{Log}\frac{H_0}{H_w} = \log\frac{H_0}{H}.$$

Now, taking logs of (11), we obtain the formula

$$\text{Log}\left\{\log\frac{H_x}{H_w}\right\} = \log\left\{\log\frac{H_0}{H_w}\right\} - mx \quad \ldots \quad (12)$$

or, as is more usually written

$$\text{Lolog}\frac{H_x}{H_w} = \text{lolog}\frac{H_0}{H_w} - mx \quad (12a)$$

We must now evaluate $m$. It is independent of the length of tube $x$, and must be a coefficient depending upon the size of the pipe and the weight of gas flowing.

More heat can be abstracted from the same weight of gas if the *cross-sectional* area of the passage is reduced. For this increases the number of contacts the molecules of the gas make with the surface of the tube through which it is flowing. Now the *hydraulic mean depth* ($k$) is a factor which is intimately related to the frequency with which a gaseous molecule will strike the surface of the wall, as is obvious from the definition.

$$\text{Hydraulic mean depth of full pipe} = \frac{\text{cross-sectional area}}{\text{perimeter}}.$$

Hence $m$ should contain the hydraulic depth ($k$) as a factor.

### *Must Allow for Speed of Flow*

Also we have seen that the greater the *speed of gaseous flow* through a pipe, the greater the transmissibility of heat. Hence $m$ must also contain an allowance for the *speed* of flow of the gas through the pipe.

Now it has been found empirically from the results of the experiments referred to above that

$$m = 0.193\,(wk)^{-0.41} \quad \ldots \quad (13)$$

where $w$ = weight of gas flowing in lb./hr.
$k$ = hydraulic mean depth of flue.

For a full circular pipe of diameter $d$ in. completely filled with flowing gas we have

$$k = \frac{\pi}{4} d^2/\pi d = \frac{d}{4} \quad \ldots \quad (14)$$

where $d$ is the diameter of the tube in inches. These formulæ allow exact design of boilers to be made when the tubes are of 2 in. diameter or less. In fact, so precisely do the practical results follow these laws that we can predict exactly the amount of steam producible from any given size of fire-tube boiler, provided that we know the chemical composition and temperature of the exit gas. The efficiency of such boilers, designed from the formulæ, enormously exceeds that of the older types. Obviously, however, for each particular furnace the boiler must be carefully designed, the tubes put in of the right length and diameter, the fan power supplied correctly calculated from the viscosity of the flue gases, so that they can be driven through the tubes at the correct speed. The frictional resistances of the hot gas in the pipes and flues must be calculated so as to avoid the depression of dust and eddy currents. In other words, scientific design is essential.

(*To be continued*)

## Dust in Combustion Gases from Power Stations

THE SIZE OF PARTICLES usually found in flue gases of electric power stations and industrial plants is discussed in a recent article in *Crushing and Grinding*, London, England.

According to this article, micro-photographic investigations show that the fine dust in chimney gases contains a large proportion of white opaque globular particles and some transparent and glass-like ones from the molten ash. Hollow spherical black globules with thick walls which are probably melted coal is also found, as well as particles of coke of various shapes and some unburned coal.

From 35 to 50% of the dust from boiler plants of one investigation was minus 200-mesh, or less than 75 microns, in size, and an appreciable amount was less than 10 microns in size (0.01 mm.).

The dust from pulverized coal firing is apparently finer than from mechanically stoked boilers, according to the screen analysis following:

SCREEN ANALYSIS OF DUST FROM PULVERIZED COAL FIRING

| Size of mesh | Millimeter | Stoker firing | Pulverized fuel |
|---|---|---|---|
| Left on 90 | Over 0.160 | 21.63% | 11.29% |
| Through 90 | Less 0.160 | 77.86% | 88.04% |
| Through 120 | Less 0.120 | 65.68% | 79.84% |
| Through 150 | Less 0.104 | 57.25% | 72.95% |
| Through 200 | Less 0.073 | 34.12% | 50.65% |
| Through 325 | Less 0.043 | 16.32% | 30.99% |

Large tonnages of this dust are now being collected with recovery percentages as high as 95 and 98%, and in some instances it has been experimented with as a puzzolana in cement or lime mixtures.

## Issues Data on Topaz

SINCE it is usually associated with cassiterite in granitic rocks, topaz is considered a valuable indicator of tin ore, says U. S. Bureau of Mines Information Circular 6502. Other minerals commonly associated with it are tourmaline, quartz, fluorite, apatite, beryl, and tungsten ores.

According to Dana, topaz occurs in cavities of rhyolite lavas and granite; in pegmatite veins, especially those carrying tin, and at times is also found as rolled pebbles in stream sands (placer deposits).

Crystals in the vicinity of Stoneham, Maine, were identified as topazes in 1882, and among the more important subsequent finds may be mentioned: on Baldface Mountain, near North Chatham, N. H.; in San Diego county, Calif., and in Mason county, Tex. None of these deposits nor others in Maine, Colorado and Utah have ever been worked except intermittently. Topaz has been found also in Georgia, Idaho, Montana and Wyoming.

Detailed information on these, and known world occurrences, and on the properties, mining methods and markets, is also given.

# Plaster Complaints: Definition, Cause, Remedy and How to Prevent Them

By A. M. Turner, E. M.
Supervisor of Plaster Quality, Three Forks Portland Cement Co., Hanover, Mont.

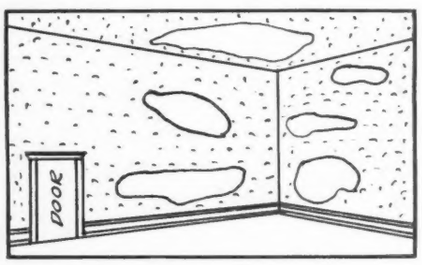
ONE of the most common complaints with gypsum plaster is the dry-out or burn-out, a phenomenon in plastered walls where the water has dried out of the plaster before it has had time to crystallize or set. The result is that all or part of the walls and ceilings will be unusually white, soft and chalky.

This condition is more prevalent in hot dry weather, and the dried out places are more likely to occur above openings or at places of maximum air circulation. A partial dry out may be pictured in walls or ceilings as white clouds designed in a light grey colored field.

### Cause of Dry-Outs or Burn-Outs

"Dry-outs" or "burn-outs" are caused when conditions for evaporation are such that the free water in the freshly plastered walls is carried away before the plaster has combined with the water and crystallized or set. A typical condition for bringing this about would be a low humidity, during a hot summer day when considerable wind was blowing and drafts allowed to circulate through the house.

*REMEDY*—In case a dry out has occurred, the portions of the walls which are white and chalky simply need a drink and will be revived by giving them a sufficient application of water. Spray clean water on the dry-outs with a hand spray, a garden




***The white, soft, chalky spots in walls and ceiling are dry-outs***

hose with nozzle adjusted to give a very fine spray, or if the white spots are small and not frequent, a brush or sponge may be used to apply water. Care must be exercised so that the water pressure is not sufficient to wash the plaster off the wall. Use just enough water so that it starts running down the wall or stands out in drops. In extreme instances if the plaster remains soft and chalky after the water has been applied and the plaster dried out, it will be necessary to apply water two or three more times using the same method described above, but do not give up or become discouraged, because the plaster will eventually set.

### Introduction

***PLASTER MANUFACTURERS undoubtedly experience more difficulty in connection with complaints against their products because distributors and consumers lack information on their proper use and the remedies for complaints, than from all other causes.***

***It is the earnest desire of the author that the information which follows will directly or indirectly prove of value to those connected with the manufacture and use of gypsum plaster, by lessening their difficulties and making it possible to handle complaints with less distress when they do arise.***

***Most plaster complaints of a clearly defined nature should not be taken too seriously, as the remedy is generally simple.—The Author.***

### How to Prevent Dry-Outs

Dry-outs or burn-outs may always be prevented in plastering work if a few simple precautions are used. The lath (assuming wood lath are used) as well as the floors should be thoroughly wet down a day before the plastering is to be done, and again about an hour before work commences. This practice not only helps to avoid dry-outs, but will go a long way toward eliminating the buckling of the lath.

Openings throughout the building should be carefully screened before plastering starts. This is done to prevent currents of air from passing through the building.

The plaster should be applied to the proper thickness, because a thin coat of plaster is much more likely to dry out than a thick coat.

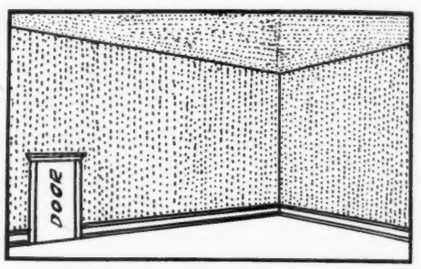
The setting time of plaster should be regulated for each market into which it is shipped so that there is the minimum possibility of dry-outs.

### "Sweat-Outs"

When, after freshly plastered walls have set, they remain damp, soft and dark in color the condition is known as a sweat-out. This condition is easily distinguished from a dry-out by the difference in color of the walls and the moisture in them. After this condition has continued several days the rooms will have a damp musty odor.

*CAUSE*—The sweat-out is just the reverse condition of the dry-out and results when, after the plaster has set, there is not sufficient heat and circulation of air to evaporate and carry away the excess water which was not needed for crystallization.

*REMEDY*—To get rid of this excess water it is imperative that heat and air circulation be gotten into the rooms. When the weather is cold, a stove or some form of artificial heat should be applied, and natural




***Walls which remain damp and dark in color and are soft indicate a sweat-out condition***

or artificial ventilation induced. Windows and doors should be thrown open, but the inside temperature must not get below freezing. Plastering which has been sweat-out for five days or less will retain its original strength after being treated as above mentioned, but when it has stood damp a longer time there will be a slight deficiency in strength.

### How to Prevent Sweat-Outs

Sweat-outs can easily be prevented by providing air circulation and artificial heat if necessary, immediately after the plaster has set. This will cause the excess water in the plaster to evaporate, and once it has left the plaster the walls will remain in a dry normal condition.

Complaints of the above nature are very common in the northwestern part of the United States, due to the high humidity; therefore when using plaster during rainy periods in the coast region in Oregon and Washington, or any similar climates, every precaution should be used to dry out the walls immediately after the plaster has set.

### Frozen Plaster

Frozen plaster is that which has been subjected to freezing temperatures while setting

or soon after it has set and the free moisture in the walls or ceilings becomes frozen. This period usually covers an interval between the time the plaster was applied and 30 hours afterward. Frozen walls are dark in color and remain damp, but are not as soft as in the case of a sweat-out.

*CAUSE*—The room temperature is allowed to fall below the freezing temperature before the water in the plaster has had a chance to dry out.

*REMEDY*—In case of frozen walls rapid action is necessary. The doors and windows should be thrown open and the plaster allowed to freeze dry. Under no consideration should plastered walls be allowed to alternately freeze and thaw, because this will kill the plaster. Additional coats of plaster should never be applied to a coat of plaster while it is frozen.

*HOW TO PREVENT*—During freezing weather freshly plastered buildings should be kept at a temperature above freezing and a circulation of air should be passed through the rooms until the walls are thoroughly dry. After this time a freezing temperature will not injure plastered walls.

### *Too Slow Set*

Plaster may be classified as setting too slow when the time required for it to crystallize and become hard takes so long that work is held up (such as applying the brown or finish coat), or the plaster begins to dry out before it sets. Usually a set slower than five hours is considered too slow.

Before drawing a definite conclusion as to the actual setting time, it is advisable to determine the setting time by testing a small sample. This can easily be done by making a 1 to 2 mixture by volume of plaster and sand mixed with enough water to make a workable mixture, and observing the setting time. For example: measure out ½ pint of plaster and mix thoroughly (dry) with 1 pint of sand. Place this material on a mortar board and make a hole, or lake, in the center by stirring the center portion with the handle of a pointing trowel. Into the lake or cup thus formed pour clean water and fold the mixture carefullly into the water and mix thoroughly. This mixture should then be placed on a clean glass and kept in the shade until it has set. If the observed setting time is slower than five hours the material can justly be termed as slow setting.

### *Cause of Slow Sets*

Slow setting plaster is not necessarily due to faulty material, but may be caused by dirty sand (or sand containing retarding material) or impurities in the water. In any event the slow set condition should not be looked upon with alarm, as there are many simple ways of correcting the set, as may be seen from the following:

1. By adding 1 quart of portland cement to a 100 lb. sack of plaster the set will be hastened. This method is particularly advisable because it adds strength to the plaster and since the cement itself is a plastering agent it adds to the wall covering capacity as well as increasing the strength of the plaster.

2. One quart of hydrated lime added to the 100 lb. sack of plaster is also effective as an accelerator and the lime itself is also a good plastering agent.

3. By scraping the sides and bottom of the mortar box and incorporating set particles of plaster in the mix the setting time will be speeded up.

4. Set plaster droppings, crushed and screened through a fly screen and added to the plaster in the proportion of about a pound to the 100 lb. sack of plaster is a good accelerator.

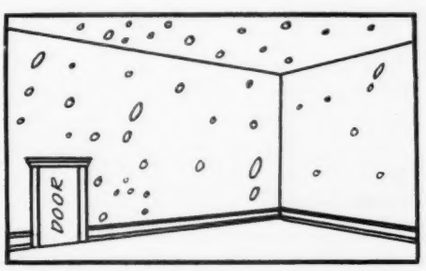
5. Add about 18 lb. of plaster of paris, or molding plaster, to a barrel of mixing water, stir thoroughly and allow to set for about an hour before using. Use this water for mixing sand and slow setting plaster to make the set faster.

6. Two pounds of alum or 5 lb. of zinc sulphate may be dissolved in a barrel of mixing water, and by using this solution for mixing, the set of the plaster will be materially accelerated.

By increasing or decreasing the amounts of accelerator specified above, the setting time of the plaster can be adjusted to meet the requirements. Any of the above methods are not injurious to the plaster.

### *Retarder Spots*

Retarder spots appear as white, soft, chalky spots varying in size from ½ to 3 in. in diameter. They may occur in walls or ceilings, sometimes in part of a room and at times in the whole room or entire building. At times these spots assume an elongated shape running in the direction in which the trowel was pulled over the wall.




***Soft, white, chalky spots in wall and ceiling caused by small bits of retarder in plaster***

The center of the surface of these spots is often stained yellow in color, and by carefully digging into the center of the spot a small greyish mass of retarder may be discovered. If the small lump of retarder which is dug out of the plaster is placed in a quarter glass of water and then about a teaspoonful of a water solution of phenolphthalein added, the retarder will liberate a pink color into the water. This scheme can be used as a proof that it is retarder which causes the white spots.

*CAUSE*—If retarder, in the powdered form, is added to the sand and plaster in the mortar box and mixed with a hoe the result will be that the retarder does not get thoroughly mixed, and small masses of it cling together. These masses of retarder in the plastered wall prevent the plaster from setting around them, and thus form a white, soft, chalky retarder spot.

*REMEDY*—If plastered surfaces are covered with white retarder spots, the spot should be wet with clean water two or three times at intervals of 30 min. to 1 hr. This treatment will set up some of the spots. The spots which remain soft and white should be dug out and patched with plaster.

### *How to Prevent Soft Spots*

Any retarder used on the job should be screened through a fly screen. The screened retarder can then be placed in a barrel containing clean water and dissolved by stirring the water vigorously. Usually the equivalent of 2 oz. of retarder to a 100 lb. sack of plaster is sufficient, but the quantity can be changed according to the setting time required. Knowing how many ounces of retarder and how much water there is in the barrel it is easy to determine the amount of water to use in the mortar box to furnish the necessary retardation for the plaster.

For example, if you have 16 buckets of water and 2 lb. (32 oz.) of retarder in the barrel, one bucket of water added to the plaster and sand in the mortar box would equal 2 oz. of retarder. The water containing the retarder should be uniformly sprinkled on the plaster and sand in the mortar box.

Dry retarder should never be added directly to the mortar box because it will often fail to get thoroughly mixed, and result in soft, chalky, white retarder spots in the wall, which will have to be dug out and patched.

### *Fast Set*

Plaster may be termed too fast set when it sets or crystallizes in the mortar box or before it can be spread on the wall and worked into place by the plasterer.

Definite proof as to whether or not the plaster is fast setting may be ascertained by making a test for setting time in a similar manner to that described under slow set. If the setting time as determined in this way is faster than 1 hr. and 15 min. the plaster is too fast setting.

*CAUSE*—It is sometimes possible that too little retarder is added to the plaster at the mill, thus causing the trouble, but by far the majority of plaster complaints are due to one of the following causes:

1. Dirty water in which tools have been washed is used for mixing water.

2. The water used contains accelerating chemicals that have been used in a filtration plant.

3. The sand used contains salts which speed up the set of the plaster.

4. Set up plaster may be scraped off the bottom and sides of the mortar box causing fast set.

5. The dry mix of plaster and sand may have been allowed to stand too long before mixing with water, which could cause a fast set condition.

*REMEDY*—If, after correcting all local conditions, the plaster is found to still set too fast, retarder (which can usually be secured from the local lumber yard) should be added as above described under the section on how to prevent retarder spots.

If commercial retarder is not available, it is possible to use pulverized glue or molasses in the mixing water to serve as a retarder. Add about 2½ lb. of pulverized glue to the barrel of mixing water and dissolve completely. About a quart of this water added to the water used in mixing the plaster and sand will usually give the required retardation.

### *How to Prevent Fast Set*

If trouble is being encountered with fast set the thing to do is to see that the mixing box and tools are kept very clean, have the water examined for accelerating chemicals, use a sand which is clean and free from contaminating salts and mix the sand and plaster with water immediately after completing the dry mix, and then deliver the mixture to the plasterers just as soon as possible. If, after taking these precautions, the plaster still sets fast retarder should be added to the plaster, as previously described, and the condition reported to the manufacturer so that the plaster can be made slower setting in the future.

### *Short Working Plaster*

Short working plaster is plaster which, on account of its improper storage in a warehouse, on a job, or due to becoming very old, has lost a certain amount of its ability to carry sand. It usually sets more slowly than it originally did, does not mix or spread easily and makes a sloppy mixture.

Short working plaster is easy to detect by the following method: Weight ½ lb. of *fresh* plaster, mix with it 1¼ lb. of dry sand and then add water in sufficient quantity to make a mixture having a nice working consistency, similar to that used for plastering walls.

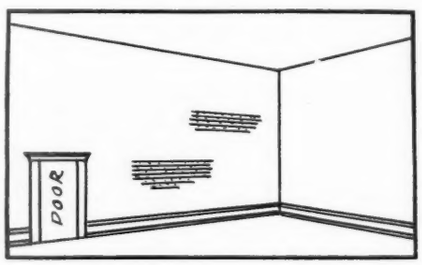
Carefully measure and observe the amount of water which was required. Pile this mixture on a glass board or hawk in the form of a cone or miniature mountain. Now take some of the plaster suspected of being short working and mix in the same proportions. If the plaster is short working the following characteristics will be observed: The mixture when piled will not stand up in the form of a mountain, but will slump down comparatively flat; the grains of sand in the fresh plaster will be well coated with plaster, while the short working material will show the absence of the plaster coating on the sand and the sand grains will stand out conspicuously. Take a handful of each mixture and squeeze tightly. Examine the cores left in the hands. In the case of short working plaster you can notice that the core which remains appears to be almost entirely of sand, while good plaster leaves a core which appears richer in plaster.

The consistency alone is not conclusive proof of short working plaster, as some plasters naturally carry more sand than others, but a sloppy consistency combined with the other characteristics of short working plaster, as described above, is definite proof that the plaster is short working.

### *Cause of Short-Working Plaster*

Often plaster becomes short-working if it is stored in a place where the atmosphere is very humid or the surroundings are damp. Plaster stored on green concrete floors or against green concrete walls will soon deteriorate. An open warehouse in which outside air can easily penetrate is a very poor place to store plaster.

The commonly accepted belief is that




***Buckling of lath causes plaster to crack along direction of lath***

short-working plaster has become that way by absorbing moisture from the air and partially recrystallizing and going back to its original form of gypsum. The writer's theory regarding the formation of short-working plaster is entirely different and may be discussed in some future article.

*REMEDY*—Short-working plaster can always be successfully used by any of the following methods:

1. Probably the best method is to use one sack of fresh material to one sack of the old. In some cases it may be necessary to use two sacks of fresh plaster with one of old or in extreme cases three sacks of fresh to one of old.

2. Another good method is to use a well slacked lime putty of hydrated lime that has been soaked overnight, in proportions of about two shovelfuls of lime to the sack of old plaster. The same amount of dry hydrated lime may be used if lime putty is not available.

By adding about half of a No. 2 shovel of K-D-Cite (a ground diatomaceous earth) to 100 lb. of old plaster it will be found that this mixture works very smoothly and a satisfactory job will result. Celite has practically the same effect as K-D-Cite.

### *How to Prevent Short-Working Plaster*

In order to prevent plaster from becoming short-working or going dead, as it is often termed, it is necessary to have proper storage facilities.

An ideal plaster warehouse is one with a tight wood floor, well insulated walls, and ceilings free from drafts and absolutely dry in every respect. Plaster stored under these conditions will keep the maximum length of time.

### *Oversanding Plaster*

In order that a plastered wall be firm and hard it is necessary that the right proportion of plaster to sand be used so that there will be sufficient plaster to thoroughly coat each grain of sand and thus securely cement it to the adjacent grains.

If an excess of sand is used this condition cannot exist, and the result is that the walls will be lacking in strength. This condition can be detected by rubbing the hand over the wall and noticing how easily the sand rubs off. Another test is to bore into the wall with a coin and notice how easily a hole may be made. Oversanded walls will not be mistaken for a dried-out condition, on account of the fact that the walls are darker in color and not white as in the case of dry-outs.

It is easier to oversand fresh plaster than it is old, for the reason that fresh plaster will work well if an excess of sand is used, while with old plaster this is not the case.

A comparatively simple test to use to conclusively prove whether or not plaster has been oversanded is to take a sample of set plaster, dry at a temperature not to exceed 140 deg. F., crush into rather fine particles and weigh 100 gr. This sample should be put into some container such as a quart pail and thoroughly mixed with water. Allow the sand to settle to the bottom and carefully decant off the water. Repeat this operation several times until it is plain to see that nothing but sand remains in the container (the plaster has been dissolved by the water). The remaining sand should be completely dried over a stove or electric hot plate and then weighed. The weight gives the percentage of sand which was used in the plaster. If the amount is more than 67% the plaster is considered oversanded.

*REMEDY*—There is no remedy for oversanded plastered walls. If the walls are so weak that the plaster will not stay on the walls it should be pulled off and replastered.

### *How to Prevent Oversanding*

Architects can do much to prevent an oversanding condition by inserting in their plastering specifications the amount of sand to be used, and then insisting that the plasterers follow the specifications.

Plasterers themselves should realize the folly of oversanding, because it takes more labor to do the work, a greater amount of plaster falls to the floor, and after a few jobs go bad the damage done to the plas-

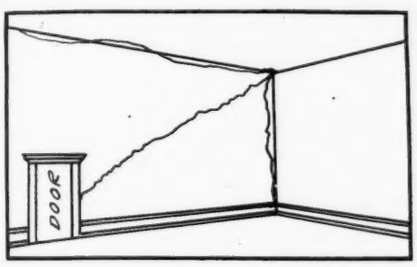
terer's reputation will far offset any saving in material there might have been.

Generally speaking it is a good practice to use 12 No. 2 shovels of sand to 100 lb. of plaster when used on wood, metal or plasterboard lath, and 18 No. 2 shovels of sand to 100 lb. of plaster when working on brick, gypsum, or clay tile.

### *Sand Requirements*

When sand is too coarse, too fine, or dirty, numerous defects may result, such as the plaster setting too slow, too fast, or the walls being weak.

To determine if a sand is dirty the following method may be used. Fill a bottle about half full of sand. Then add clear water until the container is three-quarters full and shake vigorously. Allow to settle, and if the sand




***Settlement cracks usually run diagonally across wall and along corners***

contains clay or loam it will settle on top of the sand.

To ascertain if a sand has the proper fineness it is necessary to make a sieve test and compare the results with the specifications set forth by the American Society for Testing Materials, which read as follows:

"Sand used for plastering in which gypsum is employed shall consist of fine, granular material naturally or artificially produced by the disintegration of rock containing not less than 80% by weight of silica, feldspar, dolomite, magnesite, or calcite, and shall be free from saline, alkaline, organic or other deleterious substances.

"It shall be graded from fine to coarse, and when dry not more than 6% by weight shall be retained on a No. 8 sieve; not less than 80% by weight shall be retained on a No. 50 sieve; and not more than 6% by weight shall pass a No. 100 sieve. These sieves shall conform to the requirements of the United States Standard Sieve Series."

*REMEDY*—There is no remedy for a job which has already been done and improper sand used.

*HOW TO PREVENT*—If a sand is used which conforms to the standard specifications for sand there will be no difficulty experienced on account of the use of faulty sand.

### *Too Thin Coats*

Plaster coats are considered too thin when their thickness is not as great as that specified by the manufacturer for the various plaster bases. Too thin coats are indicated when the walls are weak, but the plaster has not been oversanded.

To determine the thickness of a plastered wall, break loose a piece of plaster from several different places and measure their thickness.

*REMEDY*—The only remedy for plastered walls where the coat is too thin is to remove the plaster and replaster.

*HOW TO PREVENT*—No difficulty will be experienced with too thin plaster coats if the following specifications are practiced:

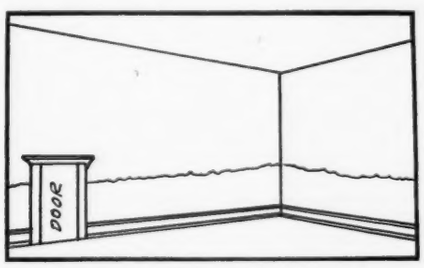
The grounds for the various plastering bases should be as follows: wood lath, ¾ in.; ⅜-in. gypsum lath, ⅝ in.; ⅜-in. gypsum lath, ¾ in.; metal lath, ¾ in.; brick or clay tile walls, ⅝ in.; and for gypsum tile walls, ½ in.

In addition to using the correct grounds the plastered walls should be rodded and brought to a true and even surface so that the plaster will not vary in thickness at different places in the wall. This condition can easily be brought about if the architect will insist.

### *Plaster Cracks*

Plaster in itself if properly mixed and applied will not crack. However, other things than the plaster which will cause plastered walls to crack are warping, swelling or distortion of wood lath. When plastering on wood lath the prime factors in eliminating plaster cracks are: (1) Always use a good grade of lath; (2) wet the lath thoroughly a day before plastering and then again one hour before plastering, and (3) lath should be properly spaced and joints staggered.

Building settlement, wind pressure, con-




***A crack running around the walls of a room about 4 ft. above the floor is brought about by building adjustment***

traction and expansion of building framework, or improper design of the joists which support the floors and ceilings may be responsible for cracking of plaster.

When cracks appear on both sides of partitions running in the same direction (making due allowance for joint staggering) it it almost definite proof that the condition is caused by settlement.

If cracks run vertically or horizontally following plasterboard joints, or horizontally following wood lath, it is an indication that there is swelling or shrinkage of the framework due to moisture or temperature changes.

Sometimes cracks will be found in the corners of rooms, or running diagonally across the walls (the diagonal is sometimes broken and follows the direction of lath for a way). This condition is brought about by the deflection of the joists.

This article has dealt entirely with common complaints on gypsum wall plaster used with sand.

A few types of complaints which are infrequent and rather of a freak nature have not been discussed. Some of these instances are found to occur only with gypsite plaster, while there are circumstances where the reverse is true.

At another time the writer hopes to prepare a paper on the subject of getting the most satisfactory results from finish plasters, including a discussion on complaints which arise in connection with these materials.

## Washington Quarry to Operate

FISHER'S QUARRY, located in Clark county, Wash., which has not been operated since the close of the World war is again to become active with the proposal of the United States government to reconstruct the jetty at the mouth of the Columbia river at Astoria, Ore.

The quarry located near Camas and Vancouver, will furnish 700,000 tons of rock for the jetty project, the contract having been let to the Columbia Contract Co. of Portland on a bid of $1,204,606.19. The quarry will not be opened for blasting for about four months, although preliminary work is starting and roadways into the quarry prepared.

The jetty at the mouth of the Columbia was originally constructed in the first years of the war but when America entered the war the contracts were discontinued and the project halted. All docks and tramways were abandoned or dismantled, and it is expected that now these will all be rebuilt. Just what transportation facilities will be used to take the rock from the quarry to the jetty is not yet decided, although barges will have to be employed to get the rock from any dock to the jetty, as the contract calls for delivery to the point of operation.

## State Rejects South Dakota Gravel on Road Job

SECURING of gravel from Hawarden, Ia., made possible the resumption of paving work north of Mitchell, S. D., recently. Inspectors from the state highway department rejected 10 carloads of gravel which had been brought from Sioux Falls for the paving work.

Highway Engineer Crampton stopped the paving work when he found gravel to contain foreign substances which would not wash out in the gravel cleansing process.—*Sioux City* (Ia.) *Tribune.*

# Costs of Motor-Truck Hauling of Sand and Gravel

## More Data from the Hearing Given Wisconsin Producers by the State Department of Agriculture and Markets

THE 8-page report of the Milwaukee hearing of the mineral aggregate producers by the Wisconsin State Department of Agriculture and Markets, in ROCK PRODUCTS, September 26, was confined to matters of general interest in relation to the competitive situation. Other much more specialized data were developed at this hearing, including the following sworn testimony in regard to the costs of motor-truck hauling.

The producer questioned operates a fleet of his own trucks as well as hires others.

*Q.* With reference to the price which you paid for hiring trucks, were there any reductions during 1931 over 1930?

*A.* Yes, sir.

*Q.* Will you tell the commission what reduction took place?

*A.* Well, in the early part of 1930 you paid 90c. on a haul that in the early part of 1931 you could get more than enough trucks to do for 70c. and less.

*Q.* When you say 70c. as compared with 90c., you mean for the same length of haul?

*A.* Per cubic yard, for the same haul.

*Q.* Are you familiar with the cost of operating trucks?

*A.* Yes, sir.

*Q.* Tell the commission how much can be loaded on a truck to comply with the state law regulating the weights of trucks and loads.

*A.* On loads which include all of our hauling, and all of which originate outside of the limits of the city of Milwaukee, it is 24,000 lb.

*Q.* That is gross weight?

*A.* Yes, 24,000 gross.

*Q.* Now, in order to load a truck 24,000 gross, with how many yards can you load that truck?

*A.* It just depends upon the lightweight of the truck. We have two trucks where we can load five yards; but the rest, the other seven, if you load five yards on the other seven, we are over-weight. In this I am, of course, referring to washed material coming from a washing plant, which of necessity is wet material.

*Q.* Now, do you know what the fair cost to the trucker is for hauling a five-yard load of sand or gravel to a given point in this territory, in order to give the trucker his cost for operating the truck and his expenses and a profit?

*A.* Yes, I do.

### *Editors' Note*

***AS in the previous report on this hearing (Rock Products, September 26, pp. 55-62), we have quoted the record rather than boil it down to the real statistics, for statistics are dry reading, and often rather meaningless without knowledge of many details. Here are both statistics and details told in an interesting way.***

***We consider this discussion of particular interest and value at this time because it introduces another angle into the current controversy over transportation rates for these commodities. Certainly railway freight rates have one notable and outstanding advantage to all concerned. They are a matter of record and the same for all shippers from the same shipping point or zone. Truck haulage rates in this instance, and we presume in many other cases, are whatever the shipper is able to bargain for.***

***This situation introduces another uncertainty, a factor beyond the control of the producer or shipper, which does much to unsettle the prices of aggregates and lead to chaotic conditions. We see nothing socialistic or out of the ordinary for the state to subject trucking contractors to laws and regulations similar to those under which other common carriers are required to operate. It would go a long way toward helping to clear up the sand and gravel muddle.***

***In Milwaukee territory the railways have recognized this truck competition and have attempted to meet it by voluntarily lowering rates on sand, gravel and crushed stone. Producers do not anticipate that these particular rates would be increased were the railways to receive permission from the Interstate Commerce Commission to increase their rates.***

***But, it would seem obvious to fair-minded observers that the railways should be aided in their bid for a return of this business by some regulation of truck transportation, at least in the interests of public safety and the preservation of the highways, by prevention of the reckless operation of trucks by irresponsible concerns, who neither know, nor want to know, their costs.—The Editors.***

*Q.* What is it?

*A.* Our experience, from our records, is that a truck hauling gravel, which is seasonal work, should get not less than three dollars per hour.

*Q.* And three dollars per hour includes what?

*A.* That is the pay to this trucker.

*Q.* That three dollars an hour is to cover wages?

*A.* His wages—all of the expenses connected with the truck.

*Q.* As well as depreciation?

*A.* Depreciation.

*Q.* Oil and gasoline?

*A.* Oil, gasoline and tires.

*Q.* And license?

*A.* And license.

*Q.* In the Milwaukee territory how many trips can a truck make in a day, hauling, say, an average of five yards?

*A.* Well, that depends upon where that haul is from. I would say from our own plant in ten hours time a truck can make eight loads.

*Q.* In other words, a truck should be entitled to receive $30—that is, $30 for a ten-hour day?

*A.* Yes, sir.

*Q.* And it could make eight loads during that time?

*A.* Yes, sir.

*Q.* That would make the price of hauling or delivering on a yardage basis how much?

*A.* For 40 yards the trucker should get $30. On a per yardage basis it would be 75c. a yard.

*Q* Now, on that basis of 75c. as compared with the basis you are paying, is the truck operating at a loss or at a profit?

*A.* Operating at a loss.

*Q.* And that does not take into consideration any other unforeseen expenditures? Is that true?

*A.* That is true.

*Q.* The truck is being worn out and there is no money to replace it?

*A.* Yes, sir.

*Q.* What effect is that having upon the trucking industry in Milwaukee?

*A.* Only to this extent; we feel that for the fellow who loses his truck through operating below cost, the truck salesman invariably finds somebody else to take his place; he will sell him a truck, and he goes along the same road to ruin as the other fellow.

*Q.* But it does result in his ruination financially, does it?

*A.* Yes, sir.

*Q.* What about the speed at which these trucks are being operated on the highways?

*A.* Well, I know of a number of instances where trucks are being operated at a speed—at an excessive speed.

*Q.* So far as you know, is there any effort being made to enforce the speed law in relation to trucks?

*A.* Oh, yes, there is.

*Q.* And how about the load?

*A.* Yes, sir.

*Q.* That is being enforced, too, is it?

*A.* Yes, being enforced outside the limits of the city of Milwaukee.

*Q.* What about the city of Milwaukee?

*A.* The city of Milwaukee, I understand, has an ordinance permitting a 30,000-lb. load.

*Q.* And can they go at any speed?

*A.* It gives the operator solely within the city of Milwaukee an advantage over the boy that is outside.

*Q.* Well, then, when the boy goes outside to get a load or the boy from outside comes into Milwaukee from outside, he can't haul as big a load as if he was in the city of Milwaukee throughout the haul?

*A.* That is true.

### *A Trucker's Own Cost Estimate*

An auditor of the State Department of Agriculture and Markets, who had examined the books and cost records of a number of producers and truckers, testified as follows:

*Q.* In your investigation of the various industries and various members of the industry, did you get any information as to the operating cost of trucks and the practice pursued in the industry of hiring trucks, and what they pay for delivering material by truck, in the so-called Milwaukee territory?

*A.* I was not able to authenticate trucking costs as well as I would like to have done. It seems that the trucking element in the whole industry is a rather volatile proposition. I did find, however, that there seemed to be a number of contracts let for hauling at 70c. per yard in the territory—well, I might say approximately west of 35th street, hauling from the Waukesha territory into that zone, if you want to call it a zone, was quite generally done for 70c. per yard. This information was gathered from some of the people of the industry and from conversation with truckers who were engaged primarily in trucking alone.

I found that there appeared to be another zone, which we might call the second zone, reaching from approximately 35th street quite generally to the river, and that a price of 80c. was quite prevalent in this second zone.

And a third zone, we might say, existed for points east of the river, in which zone a charge of 90c. seemed to prevail.

*Q.* Did you make any investigation among truck owners, truck operators, rather, as to the cost to them of delivering a yard of material from the Waukesha territory into the Milwaukee territory, at the prices which you stated?

*A.* Do you mean a man who was engaged in trucking alone?

*Q.* Yes.

*A.* Independent of anything else?

*Q.* Yes.

*A.* One truck operator in Waukesha reports that he can operate his trucks in sand and gravel distribution on a basis of 24,000 lb. gross load, at 6½c. per yard-mile, basing 2800 lb. per yard of material. This operator has a fleet of Sterling trucks, with capacity of five yards each. He operates on a haul, he says, of from 13 to 21 miles. His cost he takes for that at $16.82 per ten-hour day, on a basis of 150 miles per day. But in this cost of 6½c. per yard-mile he does not include depreciation nor contingencies which might possibly arise, such as accidents.

*Q.* From your examination of the trucker in this particular instance is it your conclusion that he was operating at a profit or at a loss by hauling material into this territory at the prices which he was receiving?

*A.* A review of his income tax return indicates that his business was not profitable.

*Q.* I would like to know whether the trucks make the money that they should on the long hauls, figuring at that basis, 6½c. or 6¼c. per yard-mile.

*A.* One of the organizations that does quite considerable of its own trucking, very kindly showed me its complete hauling record. It happens that the fleet of trucks which it operates are Macks. The company has a very complete and exhaustive truck record up to the end of the year 1930. It shows that on the Mack truck the per mile cost was 24c. The unit yard-mile cost was $0.112. The yard cost was $0.616. The bulk of the haul, however, was within the city limits of Milwaukee, or greater Milwaukee, including suburban Milwaukee, where, of course, the trucks were subject to delays of all sort of traffic and other things; getting away from the long haul. I just merely wanted to mention that, showing what the costs were.

Another firm shows per mile cost of $0.154159; unit yard-mile cost of $0.047312; with a per yard cost of $0.729361. This firm, which I am now quoting, operates on a long haul.

By giving you the figures of the haul almost wholly within Milwaukee, suburban Milwaukee, and by giving you the figures from the second firm operating on a long haul, I believe the comparison will practically answer your question.

*Q.* It has been testified that trucks must earn three dollars an hour in order to pay their expenses, and I was wondering, on these longer hauls, whether it could make it on that basis. You said at one time that you were figuring on a 150-mile day, which is a very short day's work for the truck if it is long-distance hauling.

*A.* This trucker in Waukesha gave me these figures as his basis.

*Q.* I would like to ask whether the cost of $16.82 per day on the one group that you mentioned was complete? Was that straight covering the entire year's work in the gravel industry, or was that only in the peak season, for a month or two?

*A.* The $16.82 which I mentioned, I said specifically, did not include depreciation; neither did it include any allowance for emergencies which might arise incident to accidents, things of that kind, or breakdowns.

*Q.* What period does your audit cover?

*A.* The figures, all of the figures which I have given, cover the calendar year 1930, with the exception of one or two organizations that close their fiscal year in April instead of with the calendar. I tried to make it cover a calendar year as far as possible.

*Q.* From what you heard here the probability is that it will show a much greater loss for the first eight months of 1931?

*A.* As far as the first eight months of 1931, I will give you some information, which as far as I was able to I picked out of the records of those organizations for the period of 1931 up to the date that I was working on, and I have compiled figures for the year 1931 in some instances. I will give you those figures.

One organization for five months in 1931 showed a loss of $8207.74. Another organization for a five months period showed a loss of $4987.36. Another one, for a period of six months—there was one which I was able to figure up, or rather there were two, in fact, which I was able to figure up for the entire six months. One shows a loss of $10,019.53 for six months of 1931. Another, four months of 1931, a loss of $5371.19. For a five months period, still another shows a loss of $25,698.01. Still another for six months shows a loss of $8510.19. Still another for five months shows a loss of $4769.03.

The combined losses of the trucking industry which I have given you, quoting these seven, for fractional parts of 1931, are $67,463.05. None of those whose records were available for a fractional part of 1931 shows a profit.

### *Trucks Operated at Unsafe Speeds*

*Q.* In your study of the truckers who were delivering into this territory, especially from Waukesha county and the counties outside of Milwaukee, did you gather any information as to the tendency to speed up their trucks because of the price they are getting, in order to make it cover as much territory in a shorter time?

*A.* Well, I might just relate one little instance. On the way out to Waukesha, on one of the roads, perhaps most of you will recall a big tree that has been protected with a black and white board on either side, and the road is curved around that tree. On my way out to Waukesha I met an inbound

truck right at that tree. I know how fast I was going, and I presume he was going at a like speed. In my conversation with one of these truckers in Waukesha I related the experience and he said, "Yes, it was probably one of my trucks." There is no question but what traffic over that road—and I noticed it again this morning as I came in—there is no question but what traffic is moving faster with loads of gravel than is safe.

*Q.* Your conclusion is that that is due to the fact that the prices that they are receiving are an inducement to speed up?

*A.* They admit that they have to speed up in order to make a day's wage.

*Q.* The same thing is true, I suppose, with reference to loading, overloading?

*A.* Well, most of them are hauling four yards from outside the city of Milwaukee, or at least that was their statement.

*Q.* Another question that I would like to ask: In auditing these truck companies' records, was it revealed that any of these truck companies was engaged in trucking any other products than sand and gravel?

*A.* They were trucking anything and everything they could. If they could get a back haul they would take it.

*Q.* Well, that would be reflected in the earnings of the truck, wouldn't it?

*A.* Yes. But the trucking companies alone had very meager records. As I said here a while ago, I was unable to get accurate records on the trucking operations alone. Take the sand and gravel operators, the pit operators who were doing their own trucking, their records were very satisfactory; but the trucker who engaged in trucking and nothing else would perhaps also be digging the basement of a house some place and hauling that dirt, and not engaged alone in sand and gravel transportation.

*Q.* In that case, then, the price shown per unit yard-mile really would not be true, because a man that is trucking only sand and gravel, the work is so seasonal he may be off for a week at a time, and in this instance this man may be digging a cellar, until it brings his costs down to the figures you show?

***Truckers Seldom Know Their Costs***

*A.* Yes. In my original testimony here on the hauling, in commenting on the $16.82, that is not a representative figure, I said, for the simple reason that he has not all the elements of cost included in there. I specifically mentioned that he did not have his depreciation in there, neither did he have any allowance made for emergencies of any kind. This was the actual cash outlay that this man had sustained, according to his own statement, during the year 1930, on his trucking operations. It was a very difficult matter to get dependable and definite statements from the people who were engaged in purely trucking operations. They did not have records. I do not know that they were particularly anxious to have. I am afraid they were a little bit afraid to see some of their records, would rather not know.

One man related this experience. He says, "I am hauling sand and gravel for less than cost, for the reason that I have the same trucks, that I must pay for. I have made an initial payment of $500 on each of these trucks, on a conditional sales contract; the balance is spread over 18 months. I must meet these 18 monthly payments or the truck will be taken away from me. And in order to operate and meet these payments, it is up to me to get some business."

*Q.* I would like to ask—that so much per yard cost for hauling, did that include depreciation and taxes—I mean license, insurance, etc.?

*A.* Yes, with the exception of this one. Now, I have submitted an exhibit here in this report; it is the trucking cost of three different firms, which I have designated as Firm No. 1, Firm No. 2 and Firm No. 3. The records shown by Firm No. 1 and Firm No. 2, I consider quite authentic; they were very conclusive. But the Firm No. 3, the one which I have been commenting on to some extent here, is not as complete as it should be. And that is the one which I mentioned particularly did not include depreciation charges or any charges for incidentals. The records of Firm No. 1 and Firm No. 2 do include such charges.

*Q.* There is one other question that I think is quite important. I wonder whether your investigation disclosed whether these trucks that showed a cost of so much per yard, whether they were operated 100 days a year, or 200 days a year, or 300 days a year? Evidently the length of time that the truck is operated is an important factor in the yard cost due to the fixed charges.

*A.* One of these organizations has all this truck operating record and statistical information. One of these organizations shows the number of miles that the truck was run. It shows the number of miles that the whole group of trucks operated. It shows the number of hours in the year that the truck operated, the number of gallons of gas used and the miles per gallon. It shows the expenses under the following captions: wages, gasoline, oil and grease, tires and tire repairs, repairs and maintenance of truck, license, insurance, taxes, depreciation, rent and service. These are the items of cost that were incorporated in the cost records of this organization. They show the number of miles per truck, in 1930; the average number of miles per truck, in this one organization, was 14,713 miles; the average number of days the truck was in operation was 210.

## Spends Vacation in Europe

W. M. KINNEY, general manager of the Portland Cement Association, Chicago, Ill., left early in September for a month's vacation in Europe. He was accompanied by his family. His itinerary included Sicily, Italy and France.

## Employes Give Financial Help to Quarry Owner

WHEN a sheriff's sale recently threatened to close the slate quarries of Mayor Williams of Granville, N. Y., employes of the concern raised a fund to tide the concern over its difficulties and permit the quarries to continue operation. The threatened sale was to satisfy a court judgment in favor of the Vermont Weathering Green Slate Co. for the amount of $22,043.26.

"Realizing that a sheriff's sale may mean the closing down of the only means of support of those employed by the Williams Slate Co.," says an article in the *Granville Sentinel,* "some of them withdrew their life savings, reported to be a total of about $16,000, and turned this sum over to Mr. Williams to help him out of the financial difficulty in which the sale might have placed him.

"When the sale was about to be announced, Mayor Williams had turned over the necessary amount to Sheriff Franzoni of Rutland. Nearly all of the slate manufacturers from this section were ready to bid on the property and the postponement of the sale was a disappointment to many of those who were ready to purchase valuable slate property at almost their own price.

"Mayor Williams' popularity with his employes is the result of his continuing his quarries in operation during the depression period, while some other slate companies have been closed down. Also, Mr. Williams' slogan of 'no reduction in wages' has had a distinct appeal to his workmen.

"It is reported that Mr. Williams, whose marketable slate now on his banks is estimated at $150,000, has set aside $50,000 of this product to protect his loyal workers who aided him in time of need."—*Salem* (N. Y.) *Press.*

## Orders Local Lime on Public Building

BRICK WORK on the John Rogers high school was practically at a standstill because the contractor has permitted the use of Ohio plaster as against a local manufactured plaster in the interior finish of the building at Spokane, Wash.

Evan Berg, president of the school board, announced that at a special board meeting it was ordered that local plaster be used in the remainder of the building.—*Spokane* (Wash.) *Chronicle.*

## Completing Plans for Hoover Dam Sand and Gravel Plant

PLANS are being completed for construction of a $250,000 sand and gravel plant, including machinery, for the Six Companies, Inc., San Francisco, Calif., to be erected at Boulder City, Nev. The structural engineers are Ellison and Russell, San Francisco.

# Method and Cost of Quarrying Limestone and Shale at the Quarry of the Trinity Portland Cement Co., Dallas, Texas*

By J. William Ganser†
Chief Chemist, Trinity Portland Cement Co.‡

IN 1908 the Southwestern States Portland Cement Co. broke ground for its plant on a site 7 mi. west of Dallas, on the western outcrop of the limestone belt. The mill was built by W. H. L. McCourtie and W. F. Cowham, and the first cement was manufactured during July, 1909.

The plant was originally designed for an output of 1500 bbl. per day, but not many years passed before demand exceeded this capacity and it was then increased to 3500 bbl.

The company operated under the name of the Southwestern States Portland Cement Co. until 1914, when the name was changed to the Trinity Portland Cement Co.

The quarry, situated about a half mile east of the mill at that time showed a limestone outcrop 20 to 25 ft. high, much of which was decomposed due to weathering, but the present quarry face is 35 to 40 ft. high.

The shale necessary in the manufacture of cement is obtained directly under the lime rock.

### Geology

The limestone which we quarry, commonly called "white rock," is an outstanding topographic feature of the country in that it is a well-defined formation developed in an industrial chalk and marl-limestone formation. This formation is about 10 miles wide, running east of north and south of west, and is known as the Austin chalk, which is of the Upper Cretaceous age.

Although the formation is called Austin chalk, there are only a few layers properly termed "chalk." The white rock is much softer than the blue rock which is also present in large quantity.

The Eagle Ford shales which lie beneath the Austin chalk have an average thickness of about 500 ft. They are generally soft, weather rapidly, and are predominantly blue or bluish-black. However, their upper layer is a 6-in. seam of exceedingly hard conglomerate made up of shells and sand. Below this seam there are many blue lime concretions of various sizes which obtain their color from carbonaceous material.

The overburden, a dark brown soil becoming very waxy when wet, is not stripped. It varies in thickness from a thin layer to 8 or 10 in., except for occasional pockets sometimes 2 ft. in depth.

### Physical Characteristics of Stone

The Austin chalk disintegrates quite rapidly when exposed to the weather, and the organic matter in it is leached and carried away. As a result the first 100 to 150 ft. of the outcropping limestone is cream-colored. This stone is easily broken with explosives and crushed with little difficulty. However, the quarry as it is today consists mostly of a bluish gray stone from which the organic matter has not been leached. The top 6 or 8 ft. of the quarry face is creamy white, and wherever there is a fissure the creamy-white rock is from 4 to 12 in. wide along it.

Characteristic of the Austin chalk are the large number of fault planes. The dip of these fault planes is generally about 45 deg., and the strike is northeast and southwest. We had an excellent opportunity to accurately determine these dips because of the smooth quarry face left by an Adel excavator which was at one time used to get out the rock. This excavator was an electrically operated machine with a bucket elevator, containing tool-steel cutters between every second bucket, the cutters being forced against the face of the rock and shaving off the limestone, which was picked up by the buckets and elevated to a bin and from there loaded into cars. The cuttings of this machine ranged from fine powder to pieces 2 to 3 in. long and about 1 in. in diameter. Had the excavator worked satisfactorily it would have been unnecessary to operate a preliminary crusher; but unfortunately the rock was too hard and the cost of repairing the machine became prohibitive, so its use was discontinued.

Fig. 1 shows a cross section of the Austin chalk, the beds of which have a general dip varying from 40 to 100 ft. per mile, and an average dip of 50 to 60 ft. The chalky layers are separated by thin layers of hard marly rock which on exposure to the weather disintegrate and are etched back more rapidly than the massive chalks, giving the quarry face a rippled or ledgy appearance.

The surface rock weathers into a productive, brownish-black soil.

CHEMICAL COMPOSITION OF ROCK AND SHALE, PER CENT.

| | $SiO_2$ | $Fe_2O_3$ | $Al_2O_3$ | $CaCO_3$ | $MgCO_3$ |
|---|---|---|---|---|---|
| Blue chalk | 6.60 | 1.57 | 3.13 | 85.11 | 1.05 |
| White rock | 3.20 | 1.27 | 1.61 | 92.49 | 0.95 |
| Hard marly rock, easily disintegrated | 16.82 | 2.82 | 10.60 | 65.20 | 3.74 |
| Eagle Ford shale | 51.90 | 4.86 | 19.04 | 10.17 | 2.15 |

### Prospecting and Exploration

The quarry was first opened on a face about 20 ft. high. The rock was drilled with hand augers and the drillings were sampled for chemical analysis.

Carpenters' nut augers which were used for boring the rock were 2 in. in diameter, 19 in. long and had the ½-in. threaded point removed. The augers were tempered and then sharpened with a file whenever the operator thought they needed it. About 400 to 500 ft. of rock was bored before the auger was retempered, and about 5000 to 6000 ft. were bored before the auger was worn sufficiently to be discarded.

One man operated each auger and was able by attaching 4-ft. joints of ¾-in. pipe to drill about 75 ft. a day and to put down holes 30 ft. deep. This was quite a difficult task, as it was necessary to pull the auger many times in order to remove the cuttings. After using this laborious method for several years a home-made, gasoline-driven churn drill was put into operation, but was

### Foreword

***THIS PAPER is one of a series being prepared by the U. S. Bureau of Mines describing mining and milling methods and costs at cement plant quarries. These papers are designed to disseminate detailed technical information regarding the methods used, as well as present costs on such a basis that they are comparable to those of other producers.***

***This was one of very few American cement plants using chalk as a raw material. Now the plant is using mostly a bedrock of true limestone. Bucket excavators for recovery had to be abandoned in favor of steam shovels.—The Editor.***

*Reprinted from U. S. Bureau of Mines Information Circular 6498.

†One of the consulting engineers, U. S. Bureau of Mines.

‡The author wishes to acknowledge the assistance of Fred Burkett, civil engineer, and F. O. Londrey, chief clerk, of the Trinity Portland Cement Co., for assistance in preparation of this paper. "The Geology of Dallas County, 1918," Bulletin 1818, Texas Geological Survey, Austin, Tex., by E. W., Shuler was also freely consulted.

later replaced by an electrically driven cyclone drill.

### *Sampling and Estimation of Tonnages*

None of the rock is sampled at the quarry, as it would be impossible to get a representative sample, but a continuous sample is taken after the lime rock containing some shale has been pulverized by the Krupp ball mills. The ground material is conveyed to one of four steel bins each having a capacity of 84 tons. When one of these bins is full the sample is collected for a quicklime determination in order to ascertain the percentage of shale necessary to be added to make a proper raw mixture. A composite sample of all of these bin samples is completely analyzed each month. The shale is only analyzed occasionally, as there is practically no variation in it.

### *Choice of Method*

As already stated, overburden is not removed but mixes with the rock and is loaded with it into cars for the crusher.

Open quarrying is the only feasible and most economical method of obtaining the rock. In opening the quarry the operation was simple, as the outcrop formed a bluff. Therefore, after shooting the face it was only necessary to head into the rock with a steam shovel with the quarry tracks laid on the Eagle Ford shale along the face.

The quarry face is now 30 to 40 ft. high, but it will eventually be 50 to 55 ft. high as the surface rises and the base dips away from the face.

The plan of the quarry, Fig. 2, shows that the face is now being worked in a fairly straight line, although when the quarry first opened and for many years after it was worked with a circular face.

Drainage has always been a problem. Because of the dip of the quarry floor each cut made by the shovel is lower than the preceding one and often after a rain the shovel stood in water. This water was either pumped out by a motor-driven centrifugal pump with a capacity of 300 gal. per min. or was syphoned by means of steam from the shovel.

Drainage for the present has been provided by ditches dug with an electric shovel. These ditches are much lower than the quarry floor will be for several years.

### *Mining Methods*

The lime rock, which is used only for portland cement, is quarried with 1 to 2 ft. of shale which lies directly beneath it. This rock and shale, with the additional shale which is quarried separately, amounts to 1000 to 1200 tons per day. By quarrying this amount six days a week it is never necessary to run the quarry on Sunday. The cut averages about 30 ft. wide and from 30 to 40 ft. high. The face now being worked is about 2000 ft. long on land recently purchased and is the farthest from the crushing plant approximately 5000 ft. away.

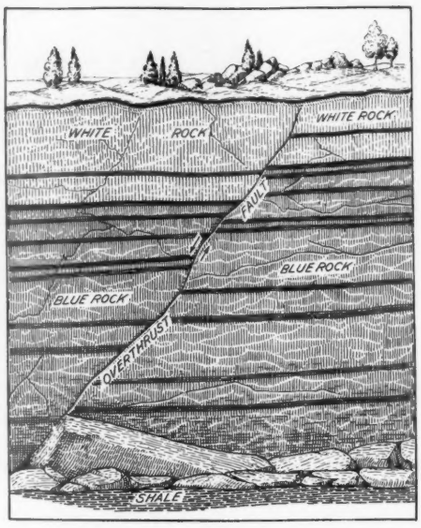



*Fig. 1. Cross section of Austin chalk*

### *Drilling and Blasting*

Primary drilling is done with a Cyclone churn drill equipped with a 4-in. bit making a 4½-in. hole. This drill is electrically operated and is self-propelled on traction wheels by a 15-hp. variable-speed motor using 550-volt, 25-cycle current. Two men operate this drill, 10 hours a day, and normally drill 180 ft. The cost of drilling labor is 7c. per ft.

The holes are drilled in two rows, the first 12 ft. from the face with holes 10 ft. apart, and the second 10 ft. back of the first row with holes also 10 ft. apart, and staggered 5 ft. off center from those in the first row.

The holes vary from 30 to 35 ft. deep, and are drilled to the shale. They are loaded so as to shatter the rock enough to pass through a 2½-yd bucket. No rock is loaded from the teeth of the bucket, but often large rocks pass through the bucket and have to be gadded before being dumped into the crusher. Gadding is done with a pointed chisel about 8 in. long, made of 1-in. octagon tool steel. There are many times when this pointed chisel is driven 5 and 6 in. into the rock without splitting it. The only thing then to do is to pull out the gad and drive it into the rock somewhere else.

The usual custom is to shoot 20 to 25 holes simultaneously. When making the primary shots 4 by 8 in. 40% Atlas "Giant" gelatin dynamite is used, each hole requiring about 50 lb. of the explosive. Cordeau-Bickford is used on all primary shots, set off with a No. 6 detonator. About 80% of the dynamite is placed in the bottom of the holes and the other 20% is placed about one-third of the depth of the hole from the top. The holes are loaded in the usual manner and tamped with dirt by a wooden pole on a rope. It usually takes 10 to 15 men about three hours to load 20 holes.

The primary shooting is done ahead of the shovel; that is, there is always a two or three weeks' supply of rock ready for it. Boulders that are too large for the rock crusher are not loaded into the cars but are laid aside for secondary shooting. The two men employed to do the secondary shooting bore a hole part way through each boulder by hand with a 1½-in. carpenter's nut auger welded into a ¾-in. pipe with a cross piece at one end. It is only necessary to use one-third to one-half stick of 40% gelatine dynamite to shatter a boulder sufficiently. Fuses about 36 in. long are used in this secondary blasting.

### *Loading*

All the lime rock at present is loaded by a No. 70 Marion steam shovel with a 2½-yd. dipper. This shovel when bought was of the railroad type, but several years ago the wheels and trucks were replaced with caterpillar traction. This change not only saved time in moving the shovel, but it also allowed two men to be dropped from the pit crew.

[This article was evidently written before the installation of the electric shovel and electric haulage system described on page 90 of this issue.—Editor.]

The shale is quarried by an old No. 60

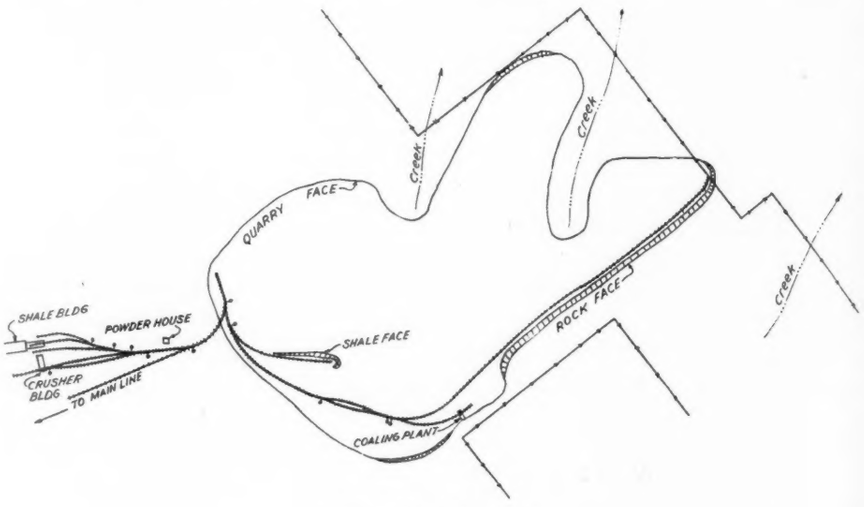



*Fig. 2. Track layout*

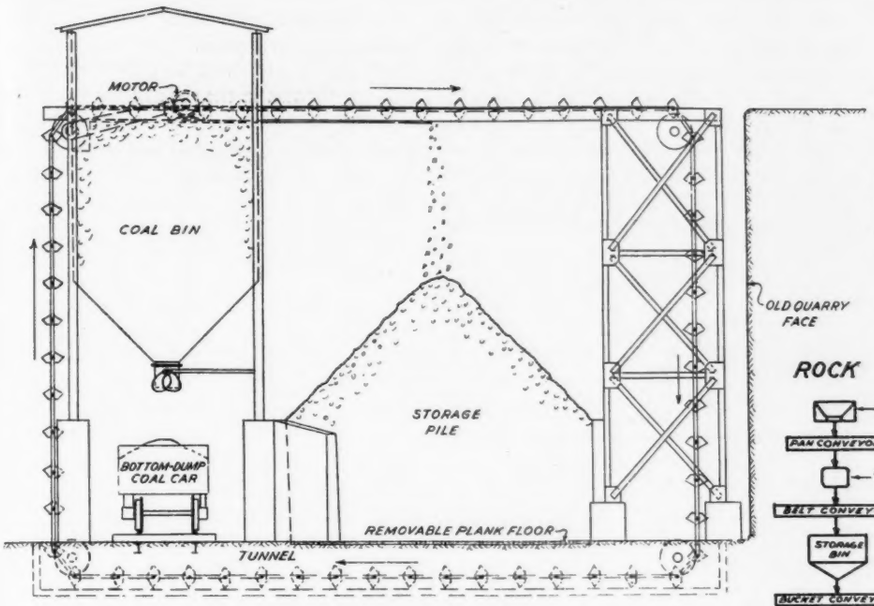



*Fig. 3. Quarry coaling plant*

Marion steam shovel of railroad type which was used about 10 years ago to load lime rock. Since only 10 to 12 ft. of shale is quarried, it is never necessary to shoot it.

### *Transportation*

All of the rock and shale is transported to the crushing plant, which is located at the mill, by two 35-ton Vulcan steam locomotives. One of these locomotives has been in operation since 1909 and the other since 1917. These locomotives each pull eight Oliver and Koppel 6-yd., side-dump cars, hauling a load of 65 tons of rock. The trains are limited to eight cars because of grades which run as high as 5%.

The quarry track is standard gage. The only double track necessary is where the locomotives stop for water and where they pass each other near the crusher, as shown in Fig. 2.

When hauling shale only four cars are used, as the shale storage will accommodate only four carloads at one time. As only 10 to 12% of shale need be added to the rock, it is only necessary to run the shale shovel at odd times; and when the shale storage is once full no shale is hauled from the quarry for several weeks.

Fig. 3 shows a cross section of the coal storage. The coal hopper will hold about 100 tons and the outside storage about 500 tons. When a car of coal is unloaded the bucket elevator first fills the hopper and when it is full carries the coal on by and discharges it on the outside storage. Coal for the locomotives and the shovels is drawn from the bottom of the hopper.

### *Crushing Plant*

The flow sheet of the crushing plant is given in Fig. 4. Coarse crushing is done by a 30- by 60-in. Allis-Chalmers Fairmount roll crusher, belt-driven by a 100-hp. 500-r.p.m. motor. (All motors at the Trinity plant are driven by 3-phase, 25-cycle, 550-volt current.) The capacity of this crusher is 250 tons per hour, but its output is limited by the capacity of the pan conveyor which handles its discharge and of the hammer mill which follows it.

The rock coming from the roll crusher, about 6 to 8 in. in diameter, is carried by a short pan conveyor, driven by a 15-hp., 750-r.p.m. motor, to a No. 8 Williams hammer mill belt-driven by a 150-hp., 500-r.p.m. motor.

The discharge from the Williams mill, which is about 1 in. and under in size, is conveyed by a 30-in. rubber belt, driven by a 25-hp., 750-r.p.m. motor, to the rock storage which has a capacity of 8000 tons. Rock is taken from this storage by a 24- by 32-in. McCaslin bucket conveyor which passes under the storage, through a tunnel and delivers the rock to two bins which feed two 6 by 70 ft. gas-fired dryers. The conveyor is driven by a 10-hp., 750-r.p.m. motor.

The rock as it comes from the quarry contains 10 to 12% moisture and after passing the Williams mill has the following screen analysis:

SCREEN ANALYSIS AFTER SECONDARY CRUSHING

| Screen size passed | Per cent. |
|---|---|
| 1½-in. | 100.00 |
| 1-in. | 90.3 |
| ¾-in. | 78.7 |
| ⅜-in. | 56.0 |
| 4-mesh | 41.7 |
| 8-mesh | 29.6 |
| 16-mesh | 22.4 |
| 30-mesh | 17.2 |
| 50-mesh | 14.9 |
| 100-mesh | 11.1 |

The dryers reduce the moisture content to about 1% burning 926 cu. ft. of natural gas per ton of rock, at a cost of 17.5c. per 1000 cu. ft. Fig. 5 shows the details of the burner which is made in our shops.

The rock from the two dryers is elevated by a bucket elevator and then conveyed by a screw conveyor to a bin which feeds six

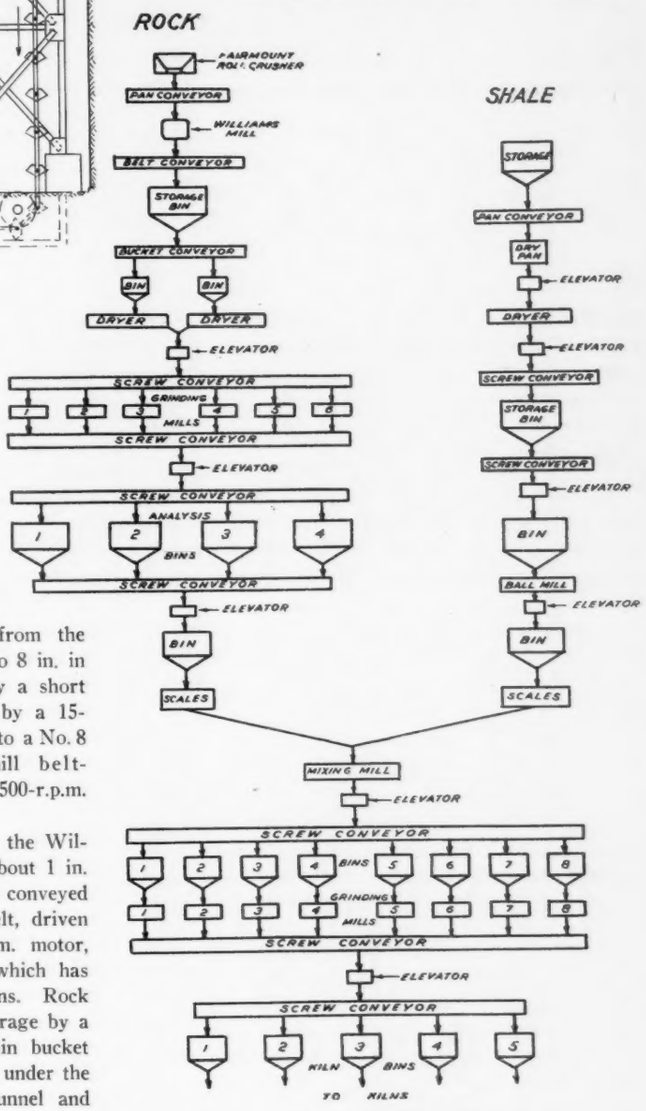



*Fig. 4. Flow sheet*

No. 8 Krupp ball mills, each belt driven by a 50-hp., 500-r.p.m. motor. The elevator is of the centrifugal-discharge or continuous-bucket type. The buckets are made of 3/16-in. iron and hold about 1 cu. ft. each; that is, they are 20 in. wide, 17 in. deep, 12 in. wide at the top and taper to about ¼-in. These buckets are attached to two No. 844 manganese-steel chains. The elevator travels 150 ft. per min., and has a capacity of 60 tons per hour. After being elevated, the

rock is conveyed by 16-in. screw conveyors in unlined sheet-iron troughs. The repairs on the screw conveyors are minor, as the Austin chalk is not abrasive but has a soapy feeling. There are many sections of conveyors that have not been replaced for years. Replacements are only necessary when large pieces of scrap iron come from the quarry, and getting into the screw conveyor, bend the flights so that they will not propel the rock along the trough.

The Krupp ball mills contain a charge of 4800 lb. of 5-in. forged steel balls. The liners are manganese plates, none of which have ever had to be replaced from being worn out; the only replacements have been when one occasionally cracked. The wear on the steel balls is about 300 lb. per mill per year. The mills each have a capacity of 7 tons per hour and contain a load of about 800 lb. of limestone; the limestone remaining about 3½ min. in the mill. The screen analysis of the ball mill discharge is as follows:

SCREEN ANALYSIS OF BALL MILL DISCHARGE

| Screen size passed | Per cent. |
|---|---|
| 4-mesh | 100.0 |
| 8-mesh | 99.1 |
| 16-mesh | 94.2 |
| 20-mesh | 82.0 |
| 30-mesh | 69.2 |
| 50-mesh | 61.9 |
| 100-mesh | 56.6 |

This material is then elevated by the same type of bucket elevator as previously described, and conveyed by screw conveyors, driven by a 25-hp., 750-r.p.m. motor, to four steel bins. These bins, each holding 84 tons, are filled one at a time and are emptied one at a time by a screw conveyor which feeds a bucket elevator driven by a 25-hp., 750-r.p.m. motor. The elevator delivers the ground rock to a bin from which it is drawn and weighed in 6-ton batches. Here the shale is added and the two materials are emptied into a 5 by 22 ft. mixing mill, belt-driven by a 50-hp., 500-r.p.m. motor.

From this mixing mill the material is elevated by a 20-in. bucket elevator, speed 150 ft. per min., and conveyed by a 16-in. screw conveyor to 8 bins over the tube mills. This elevator and conveyor are both driven by a 25-hp., 750-r.p.m. motor.

The final pulverizing is accomplished by eight 5 by 22 ft. tube mills, each belt-driven by a 150-hp., 500-r.p.m. motor. These mills discharge a "raw mix" with 90% minus 200-mesh. The tube mills are loaded with 25 tons of slugs, 1 by 1½ in. chilled castings, which wear down at the rate of about 2 tons per year. The slugs about half fill the mill. The mill is fed from a hopper-bottom bin by a 6-in. screw conveyor. The speed of this screw conveyor has been determined by experiment so as to regulate the feed to give the required fineness of ground product. The discharge from the tube mills is elevated to five bins and fed to five kilns, where it is burned at 2800 deg. F., fused into a clinker, which, when ground with 3% of gypsum, makes a portland cement.

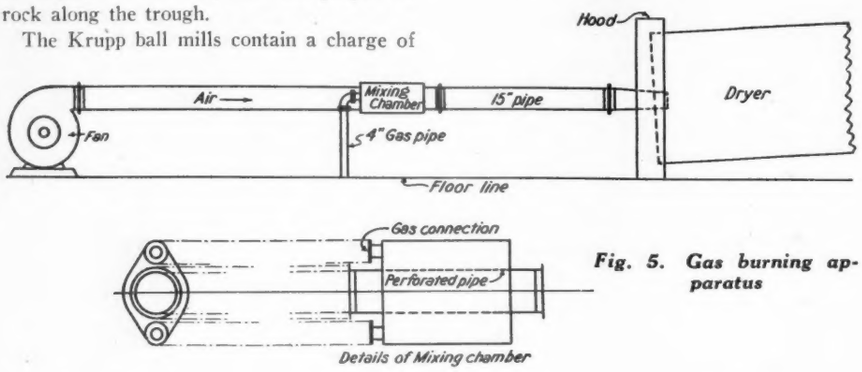



**Fig. 5. Gas burning apparatus**

The shale is crushed in a dry pan to about ½-in. size and under. This dry pan is a pulverizer commonly used at clay plants and is a horizontal, revolving table, 8 ft. in diameter, with sides about 1 ft. high. The center 4 ft. of the table is of solid steel, and the outer 2 ft. is made of cast plates in which are 9/16 by 4 in. slots. Two steel rolls, each weighing 1 ton, crush the shale as it passes between the rolls and the revolving plate. The fines pass through the slots and the coarse particles are pushed back again under the rolls to be crushed. In feeding the dry pan the shale is spouted so that it falls under the rolls. The dry pan is belt-driven by a 50-hp., 500-r.p.m. motor; and the dryer and elevators are driven by two 25-hp. motors, belted in tandem to one pulley.

The shale after being dried is elevated to a storage bin holding 4000 tons. The shale at this point has the following screen analysis:

SCREEN ANALSIS OF SHALE BEFORE FINAL PULVERIZING

| Screen size passed | Per cent. |
|---|---|
| 1-in. | 100.0 |
| ¾-in. | 98.7 |
| ⅜-in. | 94.9 |
| 4-mesh | 87.2 |
| 8-mesh | 73.3 |
| 16-mesh | 55.7 |
| 30-mesh | 34.2 |
| 50-mesh | 22.0 |
| 100-mesh | 11.6 |

From storage the shale is drawn into a tunnel, conveyed by a 12-in. screw conveyor to a bucket elevator and lifted to a small bin. It is next slightly pulverized in a small ball mill driven by a 15-hp., 750-r.p.m. motor. This ball mill was originally put in to catch the spikes and track bolts coming with the shale from the quarry. The mill contains about 400 lb. of 1- and 2-in. balls that have been worn down in the rock ball mills. From this ball mill the shale is conveyed to the scale, where it is weighed and added to the limestone. The following is the screen analysis of the shale from the ball mill:

SCREEN ANALYSIS OF SHALE AFTER FINAL PULVERIZING

| Screen size passed | Per cent. |
|---|---|
| ¾-in. | 100.0 |
| ⅜-in. | 97.3 |
| 4-mesh | 89.5 |
| 8-mesh | 75.7 |
| 16-mesh | 59.4 |
| 30-mesh | 34.4 |
| 50-mesh | 26.5 |
| 100-mesh | 19.3 |

### *Wage Scale*

All wages are paid on an hourly basis, except to the foreman and shovel engineer, who are paid by the month, and to the drillers, who are paid for the footage drilled. The normal wage scale is as follows:

| Position | No. of men | Wage |
|---|---|---|
| Foreman | 1 | $250.00 per mo. |
| Engineer (shovel) | 1 | 200.00 per mo. |
| Engineer (locomotive) | 2 | .55 per hr. |
| Craneman | 1 | .55 per hr. |
| Fireman | 3 | .375 per hr. |
| Brakeman | 2 | .35 per hr. |
| Track foreman | 1 | .425 per hr. |
| Driller | 2 | .07 per ft. |
| Car repairman | 1 | .55 per hr. |
| Car repairman | 1 | .50 per hr. |
| Laborer | 15 | .325 per hr. |

### *Safety Organization*

The safety idea has been so thoroughly instilled into the men that there has not been a lost-time accident in the quarry since November, 1927. The quarry foreman is on a committee with the other foremen from the mill, who are compelled to attend every safety meeting. Two general meetings a month are held and at least one-half of the quarry men attend each meeting, thereby making each quarry man attend one safety meeting a month.

During the year 1928 the plant was divided into seven safety groups, as follows:

1—Quarry.
2—Raw-grinding department.
3—Machine shop and laboratory.
4—Yard gang and finishing department.
5—Packing department.
6—Electricians, stockroom and office men.
7—Power house and kiln room.

Each of these groups comprised from 25 to 35 men. With all of these groups trying to avoid accidents, the plant ran during 1928 and 1929 without a lost-time accident.

At the semimonthly meetings, which have been entirely in charge of the author, a monthly bulletin, "Significant Accidents," of the Portland Cement Association is read. Every accident reported that could have occurred at our plant is thoroughly discussed, in order to benefit from the experience of other plants. Weekly inspection reports of the plant are read and recommendations are discussed and approved if thought practical. A safety engineer from the insurance com-

pany visits one of the meetings each month, giving us a safety talk and his experience in other industries.

The accident record of this plant since 1927 is as follows:

ACCIDENT RECORD, 1927–29

| Year | Severity rate | Number lost-time accidents | Days lost | Total man-hours worked |
|---|---|---|---|---|
| 1927 | 0.203 | 12 | 167 | 823,119 |
| 1928 | .000 | 0 | 0 | 798,431 |
| 1929 | .000 | 0 | 0 | 799,355 |

During the Christmas holidays of 1928 and 1929, the company, to show its appreciation of the cooperation of the men in this safety work, gave each man a check for $10, and on the Fourth of July of each year an old-fashioned southern barbecue was given to the men and their families.

In the fall of 1929 about 75 men were given the first-aid course of the U. S. Bureau of Mines. Since then much time has been given to this instruction in order to teach every man in our organization the benefits derived from first-aid training.

We feel proud of our safety organization, as it has enabled us to complete two successive years without a lost-time accident, thereby making us the possessors of a Portland Cement Association trophy.

### *Organization*

Fig. 6 shows the organization chart for the entire plant.

Overhead and miscellaneous costs per ton are as follows: Depreciation, $0.03; depletion, $0.01; insurance, $0.01, and miscellaneous overhead, $0.02, which together with operating costs give a total cost of $0.978 per dry-ton of stone mined.

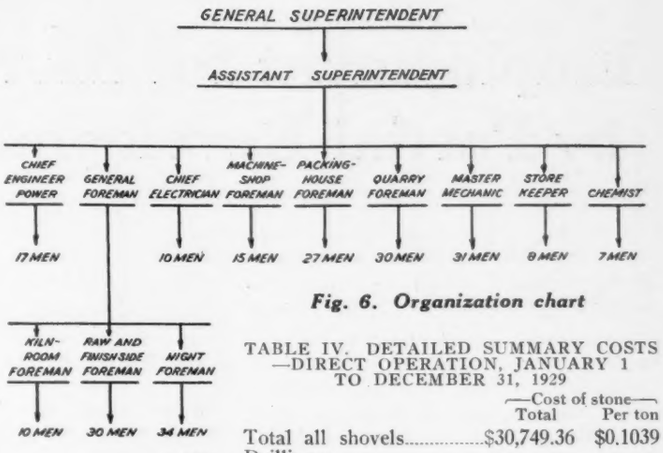



***Fig. 6. Organization chart***

| | | | |
|---|---|---|---|
| Locomotives | | | 0.0000 |
| Drills | 0.0800 | | 0.0800 |
| Crushing | | 2.2330 | 2.2330 |
| Grinding | | 22.8482 | 22.8482 |
| Elevating | | 1.4544 | 1.4544 |
| Conveying | | 1.4544 | 1.4544 |
| Drying | | 0.9467 | 0.9467 |
| Shops | | 0.2780 | 0.2780 |
| Lighting | | 0.3053 | 0.3053 |
| Fuel: | | | |
| Gas for drying rock and shale (cu. ft. per ton) | | | 926 |
| Coal for shovels and locomotives (lb. per ton) | | | 18 |
| Supplies and power, per cent. of total operating cost | | | 55.11 |

TABLE I. SUMMARY OF OPERATING COSTS PER DRY TON OF STONE MINED BY THE TRINITY PORTLAND CEMENT CO., DALLAS, TEX., JANUARY TO DECEMBER 31, 1929

(Total material loaded during period: Overburden included with stone, 295,768 tons of 2000 lb.)

| | Labor | Supervision | Air drills, steel | Power cost | Fuel cost | Explosives cost | Other supplies | Total |
|---|---|---|---|---|---|---|---|---|
| Mining: | | | | | | | | |
| Drilling | $0.0103 | | $0.0011 | | | | | $0.0114 |
| Blasting | 0.0030 | | | | | $0.0433 | | 0.0463 |
| Loading | 0.0472 | $0.0051 | | | $0.0357 | | $0.0159 | 0.1039 |
| Transportation | 0.0902 | | | | 0.0244 | | 0.0135 | 0.1281 |
| Miscellaneous | 0.0184 | 0.0050 | | | | | 0.0105 | 0.0339 |
| Crushing | 0.0166 | | | | | | | 0.0166 |
| Grinding | 0.1422 | | | $0.1144 | | | | 0.2566 |
| Elevating | 0.0027 | | | | | | 0.0015 | 0.0042 |
| Conveying | 0.0021 | | | | | | 0.0005 | 0.0026 |
| Drying | 0.0096 | | | | 0.1622 | | | 0.1718 |
| Miscellaneous plant | 0.0507 | | | | | | 0.0719 | 0.1226 |
| Total operating costs | $0.3930 | $0.0101 | $0.0011 | $0.1144 | $0.2223 | $0.0433 | $0.1138 | $0.8980 |

TABLE II. SUMMARY OF COSTS IN UNITS OF LABOR, POWER, AND SUPPLIES. JANUARY 1 TO DECEMBER 31, 1929

(Material loaded during period: Stone, 295,768 tons. Weight per cubic yard, loose measure, 2025 lb.)

| | Mining | Crushing | Total |
|---|---|---|---|
| A. Labor (man-hours per ton): | | | |
| Drilling | 0.0197 | | 0.0197 |
| Blasting | 0.0080 | | 0.0080 |
| Loading | 0.0840 | | 0.0840 |
| Haulage | 0.2090 | | 0.2090 |
| Miscellaneous | 0.0480 | | 0.0480 |
| Supervision | 0.0120 | | 0.0120 |
| Total labor | 0.3807 | | 0.3807 |
| Average tons per man-shift | | | 26.27 |
| Labor, per cent. of total operating cost | | | 43.76 |
| B. Power and supplies: | | | |
| Explosives (lb. per ton) | | | 0.2516 |
| Total power (kw.h. per ton) | | | 29.60 |
| Shovels | | | 0.0000 |

TABLE III. DETAILED AVERAGE SHOVEL COSTS, DIRECT OPERATION, JANUARY 1 TO DECEMBER 31, 1929

(Stone loaded: 295,768 tons. No. 70 Marion shovel; 2½-yd. dipper.)

| Shovel operation | Cost of stone—Total | Cost of stone—Per ton |
|---|---|---|
| Engineers | $ 2,400.00 | $0.0081 |
| Cranemen | 1,818.85 | 0.0061 |
| Firemen | 1,240.12 | 0.0042 |
| Foremen | 3,000.00 | 0.0101 |
| Pitmen | 4,103.45 | 0.0138 |
| Other operating labor | 1,884.85 | 0.0064 |
| Total operating labor | $14,447.27 | 0.0487 |
| Fuel or power | 10,568.67 | 0.0357 |
| Grease and lubricants | 285.06 | 0.0010 |
| Other operating supplies | 163.26 | 0.0006 |
| Total supplies | $11,016.99 | $0.0373 |
| Shovel-repair labor | 1,426.37 | 0.0048 |
| Shop labor | 1,265.28 | 0.0043 |
| Repair supplies | 2,593.45 | 0.0088 |
| Total repairs | $ 5,285.10 | $0.0179 |
| Total shovel operation | $30,749.36 | $0.1039 |

TABLE IV. DETAILED SUMMARY COSTS —DIRECT OPERATION, JANUARY 1 TO DECEMBER 31, 1929

| | Cost of stone—Total | Cost of stone—Per ton |
|---|---|---|
| Total all shovels | $30,749.36 | $0.1039 |
| Drilling: | | |
| Operating labor | 2,703.82 | 0.0090 |
| Operating supplies | 313.27 | 0.0011 |
| Repair labor | 167.46 | 0.0006 |
| Repair supplies | 194.04 | 0.0007 |
| Total drilling | $ 3,378.79 | $0.0114 |
| Blasting: | | |
| Labor | 878.00 | 0.0030 |
| Explosives | 12,794.00 | 0.0433 |
| Total blasting | $13,672.00 | $0.0463 |
| Haulage: | | |
| Locomotives | 12,804.22 | 0.0433 |
| Cars | 6,700.60 | 0.0226 |
| Track maintenance | 18,390.19 | 0.0622 |
| Total haulage | $37,895.01 | $0.1281 |
| General charges | 10,018.21 | 0.0339 |
| Grand total | $95,713.37 | $0.3236 |

## Claims Discrimination in Award of Ohio Road Materials

GROSS DISCRIMINATION against low bidders in purchases of road materials and tires by the Ohio state highway department was shown to the Senate Highway Investigating Committee, by C. R. Bowen, Cincinnati, an auditor engaged to make a check of purchasing methods.

Mr. Bowen submitted figures to show that on the purchase of a road material known as T-18-A on bids submitted in March, 1930, the highway department wasted $11,020 by ignoring the low bidders and awarded contracts in all cases to the highest bidder.

"There can be no doubt of gross discrimination in this case, because there was no difference in the material offered by the three companies which submitted bids on this product. The highway department chemist admitted that he could not detect any difference in the three samples submitted to him for analysis."—*Cleveland* (Ohio) *Press.*

## Fluorspar and Cryolite in 1930

DETAILED INFORMATION on fluorspar and cryolite in the United States in 1930 has been issued by the Bureau of Mines. Production, shipments, a record, by states, of operations in 1930, exports, imports and consumption are described and statistics given.

# Employment for More Than 113,000 Men by Partial Development of Muscle Shoals

By A. G. Schwinger*

THE PUBLIC should be brought to realize the momentous importance of operating Muscle Shoals; to the average citizen the picture is a power house and industrial plant, off in a more or less obscure part of Alabama, seemingly meaning nothing to the tradesman remote from the vicinity and not much to those within nearer range; whereas the entire eastern half of this country is vitally concerned, particularly now, due to scarcity of business and unemployment.

When it is considered what a meager $40,000,000 outlay for power and industrial plants at this time would accomplish, every effort should be directed toward their early activity; $40,000,000 for a power plant and a fertilizer plant to supply only a small proportion of the total acreage of farm land in this country would directly employ 6400 men at the property and a resultant total of 107,350 men elsewhere.

### *What It Would Mean to Employ 6400 Men*

On the basis of these 6400 men directly employed and receiving an average wage of $1500 per year and on the assumption that they save 12½% of this wage per year and spend the remainder with the food merchant, clothing merchant and others, the money so spent with tradespeople on the basis of $3000 per year per merchant would enable each to derive the same benefit as the direct employe, i.e., put away the equal in savings and spend the balance with the tradespeople for the costs of commodities sold and for similar maintenance of himself. In this manner 113,753 people could be benefited during the next two years. Of course if the entire 700,000 hp. were developed and used in similar industries the above mentioned possible employment chain could be multiplied by 3½.

To substantiate these figures and give some idea of the buildings and equipment requirements of the fertilizer plant a cost estimate is shown based on present day costs of the principal materials of construction that would be used. This cost estimate is based on utilizing 200,000 hp. for such fertilizer manufacture with facilities for ferro-alloy manufacture when fertilizer is off peak. In this estimate the direct labor is shown in the right-hand columns and the indirect or outside labor is derived from the material costs by allowing 10%, only, for the material in its natural or unmined state.

### *Also Operating Labor*

Another thing which should not be lost sight of is the fact that this small plant in its regular operation would employ 2100 men who on the same basis of remuneration, viz., $1500 per year and with the same savings, etc., would keep an additional 19,677 men in similar condition as to living and yearly savings.

No account has been taken of the necessary employment of labor to handle the savings per man per year. Freight and other carrier charges on equipment and raw materials has also been omitted. If the savings themselves were included there would be a resultant increase in the above mentioned employment for banking, but freight may be construed as distributed among the listed employment with the savings as railroad profits.

Incidentally the railroads would handle an additional tonnage during these two years of approximately 500,000 tons and a regular yearly tonnage, after the plant is in operation, of limestone, coal and coke or raw materials, amounting to 1,750,000 tons and a finished product amounting to 1,250,000 tons.

The cost estimate and description will give tradespeople an insight into the possible benefits to be derived by going ahead with this project, and although the estimate is based on the manufacture of cyanamid and the further progression of it to urea, it is quite closely comparable to the manufacture of the other well known fertilizers. It would seem, however, that guano should be used where deposited, phosphate where found and a manufacturing plant for fertilizer made from nature's resources should be centrally located to serve most economically. Muscle Shoals is admirably situated for this.

Another feature of this development is that it would favor particularly the farmers not now using any fertilizer and that the present fertilizer manufacturers would not be injured in any way, in my opinion.

In conclusion, some of our outstanding corporations find it advantageous to retire an old plant and rebuild in a new location, expending $25,000,000 to $50,000,000, which usually means moving the employment from one place to the other; whereas here we have an immediate expedient toward giving a helping hand to unemployment, a benefit to the western farmer and man in general without treading on anyone's toes.

The method by which the possible employment is calculated is as follows: The wages of 6400 men at $1500 each per year or $9,600,000 is equivalent to $7,200,000 of circulating money.

The circulating money, $7,200,000, at $3000 per merchant per year would be distributed among 2400 merchants or to 800 merchants of each of the three classes—food, clothing and others. Deducting savings for each merchant would leave $6,300,000 of circulating money again.

Carrying this through by calculus, the final summation shows that a total of more than 23,600 men would be employed or share in the distribution. In the same way the outside labor of $6,387,000 would employ 19,200 men. This would give a total of more than 45,800 men.

A power plant development of 200,000 hp. at a cost of $120 per horsepower would amount to $24,000,000. Allowing 40% of this for plant labor and deducting 10% of the balance as being the value of the material resources would leave $22,560,000 for total labor. Distributing this on the same basis as already shown above would employ 67,920 men. This, together with the 45,800 men previously noted, gives a total of more than 113,000 men who would share in the development.

### *Running Into Big Figures*

If it were economically possible to utilize the entire available power source the employment shown above would be multiplied by 3½ or give employment to about 400,000 men, which borders on 10% of the 5,000,000 men mentioned in the press as out of employment or approximately 25% of the total unemployed who actually desire employment.

* * * * *

According to the *Wall Street Journal*, the excutive committee of the American Farm Bureau Federation has deferred action on proposed plans for operation of the Muscle Shoals fertilizer plants, pending receipt of more information.

The Farm Bureau Federation looks with favor on a plan of operation for the project which will include as a controlling factor, at

*Mr. Schwinger is a graduate engineer who was with the Union Carbide Co. at Niagara Falls, N. Y., for 17 years as mechanical engineer in charge of design, construction and renewals of the company's plants at Niagara Falls, Sault Ste. Marie and other points. His work during this time included electric furnace design for the making of carbide, ferro alloys and pig iron, the layout and construction of two Canadian quarries for the American Cyanamid Co., dust collection in furnace and lime plants and general material handling.

While at Niagara Falls, Mr. Schwinger made complete cost estimates on the buildings and equipment necessary to operate Muscle Shoals for the production of fertilizer, carbide and ferro alloys and should be well qualified to give an idea of what the operation of Muscle Shoals would mean in man power and the various commodities which would be required.

COST ESTIMATE OF CYANAMID OR UREA PLANT FOR MUSCLE SHOALS, ALABAMA

| Description | Total estimated cost | Steel | | Brick | | Lumber | | Concrete stone and cement | | Piping and plumbing | | Electric light, heat and wiring | | Roofing | | Equipment | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Material | Labor | Material | Labor | Material | Labor | Material | Labor | Material | Labor | Material | Labor | Material | Labor | Material | Labor |
| Office building | $ 255,000 | $ 38,900 | $ 25,600 | $ 8,800 | $ 13,200 | $ 10,000 | $ 10,000 | $ 12,400 | $ 18,600 | $ 13,300 | $ 24,700 | $ 8,800 | $ 13,200 | $ 3,000 | $ 2,000 | $ 19,550 | $ 33,450 |
| Locker, lunch and recreation building | 279,000 | 24,000 | 16,000 | 13,200 | 19,300 | 5,000 | 5,000 | 4,800 | 7,200 | 30,000 | 70,000 | 9,600 | 14,400 | 6,000 | 4,000 | 17,500 | 32,500 |
| Electric switch station | 1,220,900 | 19,200 | 12,800 | 44,000 | 66,000 | 10,000 | 10,000 | 80,000 | 120,000 | 7,000 | 13,000 | 9,600 | 14,400 | 9,600 | 6,400 | 280,000 | 520,000 |
| Machine shop | 540,000 | 24,000 | 16,000 | 14,800 | 22,200 | 13,000 | 13,000 | 46,000 | 69,000 | 10,500 | 19,500 | 16,000 | 24,000 | 7,200 | 4,800 | 84,000 | 156,000 |
| Pump and compressor station | 360,000 | 42,000 | 28,000 | 19,200 | 28,800 | 7,000 | 7,000 | 36,000 | 54,000 | 8,400 | 15,600 | 9,600 | 14,400 | 12,000 | 8,000 | 24,500 | 45,500 |
| Furnace department | 2,840,000 | 276,000 | 184,000 | 40,000 | 60,000 | 20,000 | 20,000 | 52,000 | 78,000 | 28,000 | 52,000 | 12,000 | 18,000 | ..... | ..... | 700,000 | 1,300,000 |
| Cooling department | 826,000 | 177,600 | 118,400 | 9,600 | 14,400 | 6,000 | 6,000 | 28,000 | 42,000 | 2,800 | 5,200 | 6,400 | 9,600 | ..... | ..... | 140,000 | 260,000 |
| Urea department | 540,000 | 42,000 | 28,000 | 19,200 | 28,800 | 7,000 | 7,000 | 36,000 | 54,000 | 8,400 | 15,600 | 9,600 | 14,400 | 12,000 | 8,000 | 105,000 | 145,000 |
| Packing department | 656,000 | 43,200 | 28,800 | 46,400 | 69,600 | 3,000 | 3,000 | 16,000 | 24,000 | 1,700 | 3,300 | 4,800 | 7,200 | 3,000 | 2,000 | 140,000 | 260,000 |
| Cyanamid and nitrogen department | 1,580,000 | 192,000 | 128,000 | 84,000 | 126,000 | 33,000 | 33,000 | 68,000 | 102,000 | 14,000 | 26,000 | 12,000 | 18,000 | 26,400 | 17,600 | 245,000 | 455,000 |
| Storage department | 907,000 | 280,000 | 186,000 | ..... | ..... | 30,000 | 30,000 | 104,000 | 156,000 | 3,500 | 6,500 | 20,000 | 30,000 | ..... | ..... | 21,000 | 39,000 |
| Lime kiln department | 1,396,000 | 246,000 | 164,000 | 10,400 | 15,600 | 20,000 | 20,000 | 16,000 | 24,000 | 7,000 | 13,000 | 16,000 | 24,000 | ..... | ..... | 252,000 | 568,000 |
| Coke dryer department | 348,000 | 42,000 | 28,000 | 4,000 | 6,000 | 9,000 | 9,000 | 8,000 | 12,000 | 3,500 | 6,500 | 8,000 | 12,000 | ..... | ..... | 70,000 | 130,000 |
| Metallurgical, chemical and electrical department | 1,300,000 | 204,000 | 136,000 | 84,000 | 126,000 | 33,000 | 33,000 | 68,000 | 102,000 | 14,000 | 26,000 | 12,000 | 18,000 | 26,400 | 17,600 | 140,000 | 260,000 |
| Drum shop | 820,000 | 60,000 | 40,000 | 37,000 | 55,000 | 33,000 | 33,000 | 115,000 | 172,000 | 27,000 | 48,000 | 4,000 | 6,000 | 18,000 | 12,000 | 56,000 | 104,000 |
| Unloading trestle | 570,000 | 102,000 | 68,000 | ..... | ..... | 20,000 | 20,000 | 100,000 | 150,000 | ..... | ..... | 4,000 | 6,000 | ..... | ..... | 35,000 | 65,000 |
| Gantry storage | 725,000 | 240,000 | 160,000 | ..... | ..... | 10,000 | 10,000 | 80,000 | 120,000 | ..... | ..... | 2,000 | 3,000 | ..... | ..... | 35,000 | 65,000 |
| Locomotive, cranes and cars | 300,000 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | 105,000 | 195,000 |
| Trackage | 200,000 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | 70,000 | 130,000 |
| Sewers | 200,000 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | 70,000 | 130,000 |
| Piping | 500,000 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | 175,000 | 325,000 |
| Conduits | 340,000 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | 119,600 | 221,000 |
| Totals | $16,702,000 | $2,056,600 | $1,368,400 | $434,600 | $651,400 | $269,000 | $269,000 | $870,200 | $1,304,800 | $179,100 | $344,900 | $164,400 | $246,600 | $123,600 | $82,400 | $2,903,550 | $5,339,450 |

| | |
|---|---|
| Total labor at plant | $ 9,605,000 |
| Total material (including labor on raw material) | $7,097,050 |
| Total value natural raw material (10%) | 709,750 |
| Difference (labor) | $6,387,300 $ 6,387,300 |
| Grand total (labor) | $15,992,300 |

least, a farmer-owned corporation. The bureau does not favor government operation, but would not release the power development solely to a utility corporation.

Col. J. I. McMullin, one of the war department members of President Hoover's Muscle Shoals Commission, suggested a plan whereby Congress would enact enabling legislation for leasing the development to a qualified utility operating company.

Money received from the lease would be divided 25% and 75%, respectively, between the U. S. Department of Agriculture and a corporation to be organized by the Farm Bureau Federation to finance research, marketing and application of fertilizers. The Farm Bureau's corporation would afford distribution and credit for fertilizers.

## Defends State Road Programs

AT THE ANNUAL MEETING of the American Association of State Highway Officials held at Salt Lake City, Utah, recently, W. C. Markham, executive secretary, presented data on state highway construction in defense of states against charges that states are lagging.

Mr. Markham showed that almost $115,000,000 more contracts were let in the first six months of this year than last year. He also cited the fact that 23 states increased the contracts during this period to an amount of over $64,250,000 above their allotment of the special emergency loan from the federal government. Of particular interest was the statement that the largest income in the history of road building was received by states in 1930.

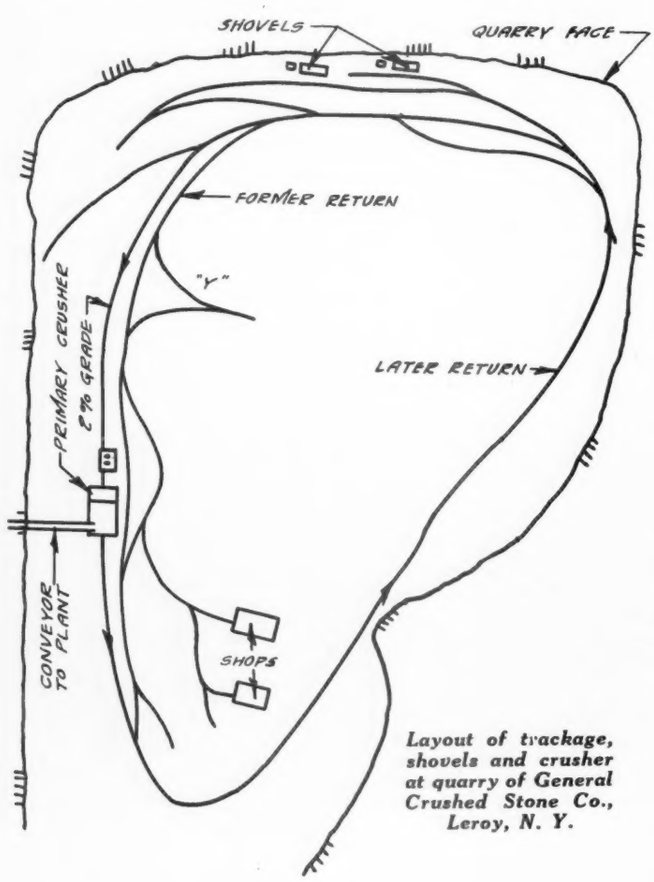
*Quarry of Leroy, N. Y., plant of General Crushed Stone Co.*

# Improving Quarry Transportation

By G. D. Fraunfelder
Easton Car and Construction Co., Easton, Penn.

NEAR THE END of the 1930 operating season the Easton Car and Construction Co. quarry engineers were requested by the General Crushed Stone Co., Easton, Penn., to make a survey of the transportation system in use at its quarry at North LeRoy, N. Y. The purpose of this survey was, if possible, to increase production and reduce to the minimum the number of men necessary to operate it.

During the 1930 season this quarry had a total capacity of approximately 400,000 tons of crushed stone which, over the number of days operated throughout the season, was equal to 300 tons per hour. This tonnage was handled in 4-yd. capacity, 36-in. gage contractors' type cars, hauled by 18-ton steam locomotives.




***Layout of trackage, shovels and crusher at quarry of General Crushed Stone Co., Leroy, N. Y.***

The rock was loaded at the quarry face by two steam shovels each with 3-yd. capacity dippers and was discharged from the cars to a 48-in. by 60-in. primary jaw crusher. The layout of trackage and the system employed to handle the trains is shown in one of the illustrations.

A careful study of the loading, dumping and dispatching of the cars showed that the capacity of the plant was limited by and was dependent upon the movement of each train after it was loaded at the shovel.

In the system then in use the locomotive was kept coupled to each train of cars for switching and spotting at the primary crusher. Also the return trackage was excessively long, the layout of tracks at the shovel did not permit flexibility of loading and the cars were being dumped in to one side of the jaw crusher instead of from the front. These various details served to decrease the capacity of the crusher and the plant output.

Further studies were made in conjunction with the engineers of the General Crushed Stone Co. and it was found that by a rearrangement of the tracks and the installation of a new crusher hopper, etc., the capacity of the plant could be increased from 300 tons per hour to 400 tons per hour; or that the plant could be operated at 500,000 tons per season capacity by working less hours per day—in both cases with a reduced force.

### *Changes Recommended*

Certain changes were recommended in the loading, moving of cars both to and from the shovels and the unloading at the crusher so as to make each a distinct, separate operation and not dependent upon any definite cycle of loading, time element in train movement or crusher capacity. These changes permit the system to have independent loading, that is, one shovel can work even though the other is shut down on account of repairs, blasting or shifting of the tracks. The crusher, instead of crushing stone intermittently, approaches continuous operation, and train movements are independent of both shovel and crusher.

It was found desirable that the locomotives remain with each train at the shovel, thus permitting quick spotting of each car under the dipper, and after being loaded movement without delay to the crusher. At the crusher the locomotive leaves the loaded train and is ready to dispatch at once an empty train to the shovels. The dispatching

of empty and loaded trains to and from the shovels by this system assures loaded trains waiting at the crusher at all times, and a like number of empty trains ready at the gathering point or en route to the shovels.

The handling of the trains at the crusher is entirely independent of the haulage system, each train being handled past the crusher by a car puller operated by the crusher man. This is shown in the accompanying illustrations.

### *Definite Cycle of Operations*

The cycle of operation, starting at the crusher, is as follows: The incoming loaded trains are fed to the car puller by gravity, being retarded at the point of entering the car puller by means of an automatic track brake. Each train remains intact and the cars are spotted in position for dumping into the crusher hopper by the crusher man. After the last car of each train is dumped the train proceeds through the car puller, is released and runs by gravity down a 1½% grade to the switch house. From this point all empty trains are dispatched by the switch house operator to either shovel *A* or *B*, whichever requires the next train for loading.

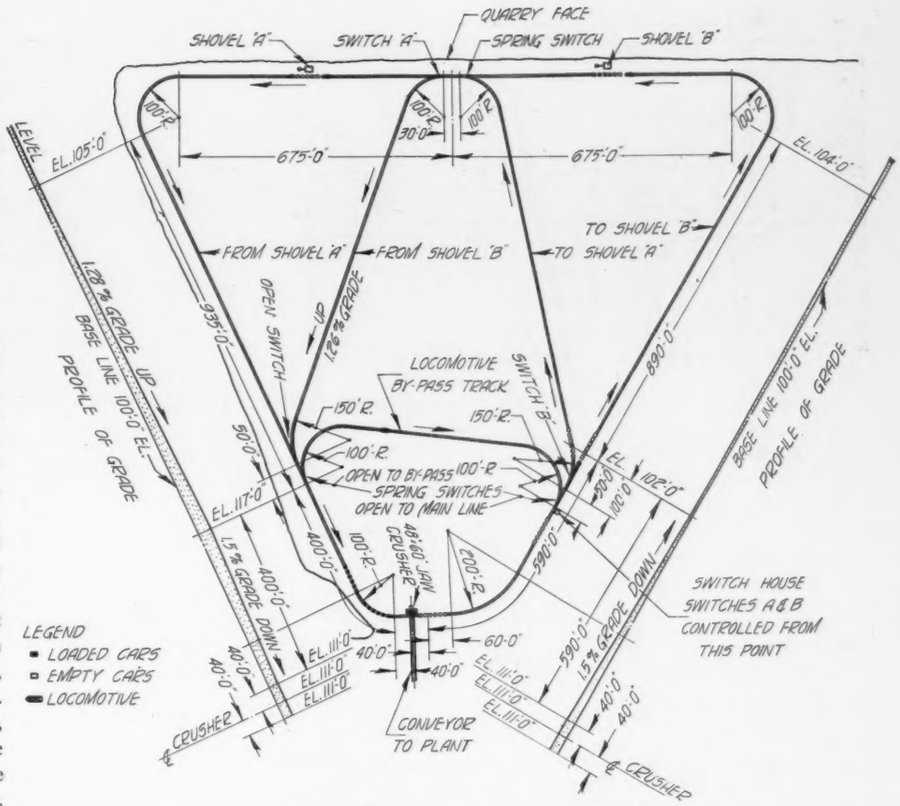
The empty trains proceed to the shovels, where they either wait or immediately move into position beside the shovel to replace the loaded trains moving out to the crusher. After passing through the open switch to the by-pass track near the crusher the locomotive cuts loose from the loaded train, the train proceeding by gravity to the car puller and the locomotive proceeding over the by-pass track to the position where it picks up the next empty train.

### *Desirable Features*

This system has a number of desirable features: the cars are always handled in trains; the locomotives always push, eliminating coupling; the locomotives never enter the crusher platform to interfere with continuous crushing, and the shovels work independently of each other, permitting shifting of tracks, blasting, etc., without serious curtailment in production.

Another important feature is that all switches except those marked *A* and *B* are spring switches, which are always open in one direction. Switch *B* is controlled manually and switch *A* by electric remote control by the switch house operator. The dispatching of trains over the entire system is therefore accomplished without delay in train movement by one man at the switch control house.

A drawing was made covering the new system and showing all dimensions, location of switches and track, profiles of all grades, etc., so that the change could easily be made to the new system. Details of the crusher hopper, car puller and car dumping arrangement at the crusher are shown in another illustration.



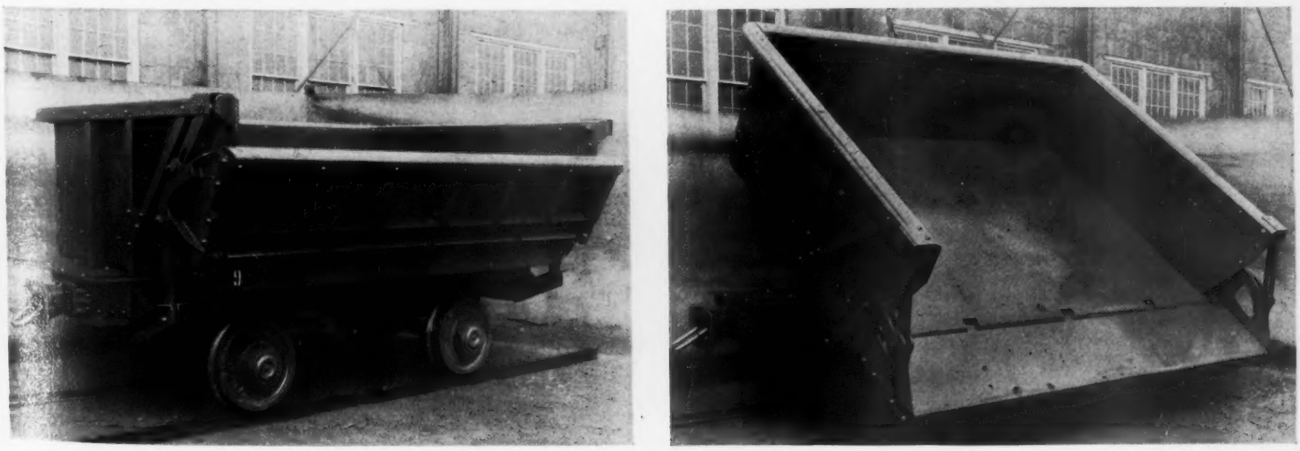

***Revised layout of quarry operations***

Easton WonWay steel cars of 5-cu. yd. capacity are used in the new haulage system. These have an automatic opening and closing door on one side and are operated on a 36-in. gage track. They are equipped with bullnose bumper, link and pin couplers and double-acting type spring draft rigging and have spring suspended Timken wheel bearings.

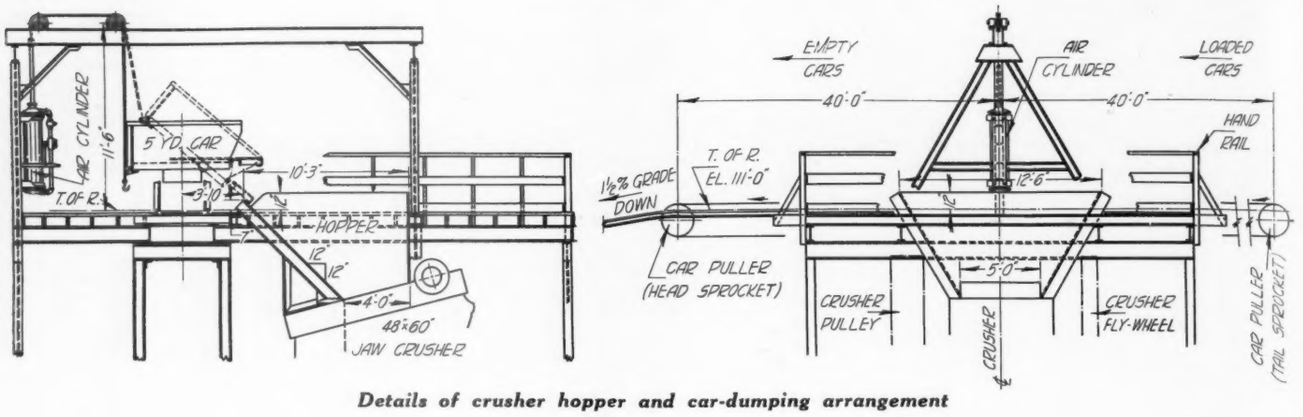
### *Save Locomotive and a Dozen Men*

The new system is being operated with six trains of seven cars each and three locomotives, which is a saving of one locomotive and 10 to 12 men, with increased output as compared to the previous system.

A unique and interesting type of portable



***Type of quarry car, showing loading and dumping positions***




***Details of crusher hopper and car-dumping arrangement***

track has been installed by the company along the quarry face. This consists of mounting rails on special section steel ties turned up to a liberal radius at each end so that each section can be moved by a truck or tractor to and from the face when blasting.

## Cement Markets of Mexico

PRESENT opportunities for the sale of American cement in Mexico are in general not considered particularly significant. In recent years Mexican firms have observed the extent of natural domestic markets, and have constructed plants where reasonable outlets became evident, producing cements which, except in a very few cases, suffer little by comparison with imported cements.

However, there are certain areas along the coast into which imported cement penetrates. The basis of competition is chiefly one of price, since nearly all of the cements in international trade are of sufficiently high quality for most purposes.

With one exception, special cements are not manufactured in Mexico, but American shippers of these grades meet some competition there from other foreign producers. Considering the country as a whole, however, this demand is greatly limited, and the relatively high price of special grades in comparison with portland cement is an expected obstacle to increased consumption.

National consumption has more than doubled since 1922, and domestic production has increased at about the same rate, remaining about equal to 85% of consumption. The approximate annual consumption of cement, all classifications, in Mexico in recent years has been 1,551,270 bbl., or 0.0945 bbl. per capita.

Plants in operation in the spring of 1931 had a total annual capacity of 2,310,000 bbl. "Nacional" and "Tolteca No. 2," two new plants, will add 525,000 bbl. to this total. Tolteca No. 2 is not expected to begin production before January, 1932. It would appear that the five active plants operated at about 57% of their capacity in 1930.

The Mexican cement industry is fostered by a high protective tariff. Since January 1, 1930, a duty of 2 centavos per gross kilo, or approximately $1.70 a bbl., has been assessed on imported cement. To the basic import duty should be added the usual surtax of 3% of duty.

The attitude of consumers toward American cement in the parts of the country in which it has been marketed during recent years is favorable. However, the combination of high tariff and high inland freight rate militates against its sale in the main consuming areas, notably the Mexico City area. At present the import trade in cement appears to be almost entirely confined to Baja California, Sonora, Sinalos, and the Yucatan district, and when the Nacional plant at Villa de Seris is completed it will doubtless be in a position to control the market in Sonora and Sinaloa, as well as the east coast of Baja California.

It is estimated by the local trade that approximately 2000 tons of white cement are imported annually, the major part of which is supplied by one American firm. It is usually imported in barrels of 376 lb., but some is imported in paper-lined bags. White cement is reported to sell at approximately 30 pesos per bbl., c.i.f. warehouse Mexico City.

Handling charges at ports of entry vary widely. Inland freight charges are very high, and in addition to the heavy duty have been an important factor militating against importation of cement.

While the Pacific section of Mexico receives much of its cement from the domestic "Tolteca" plant, it is also the only part which imports any considerable quantity. American and Japanese cements are delivered at Pacific ports, and the Ensenada district uses American cement exclusively. When the new cement factory at Hermosillo, Sonora, is operating regularly the company expects to be able to offer its product at prices considerably below those for imported cements.

This is a summary of information contained in Special Circular 3 of the Minerals Division of the U. S. Bureau of Foreign and Domestic Commerce.

## Legion Considers Promotion of Needed Public Works Major Duty

OF INTEREST to rock products producers is the activity of the American Legion in promoting the construction of needed public works. Immediate results are being accomplished in its work. In order to coordinate efforts in this program, a conference of official representatives of many states and cities, the Chamber of Commerce of the United States, the American Federation of Labor, of transportation and of the various government departments dealing with unemployment was called in Washington, September 14. Out of this conference definite objectives were determined, and the following are among those things of direct interest to the rock products industry as presented to the Legion convention recently held in Detroit:

"Make work. Wherever possible create work instead of direct relief to hold up the morale and courage and pride of our people.

"Create public sentiment that will release to the building stage public improvements of federal, state and local character, to the end that more work will be available for the unemployed, and as far as possible hire workers in their own communities.

"Your committee affirms its confidence in the soundness of the Legion program for needed public works to relieve unemployment. Cities and states representing every section of the country reported at the Washington conference temporary solution of their unemployment problems by carefully planned public works programs."

In summarizing this program the chairman said: "This is not the time to criticize. It is a time when every true American citizen must join hands with his neighbor; when the general public and the municipal, county, state or federal officers must work together in complete accord; when the man who works for a living and the employer must meet this problem shoulder to shoulder. Meanwhile it remains the Legion's major duty to cooperate with all existing agencies to relieve emergency distress, to continue seeking work for the unemployed, and to promote needed public projects."

# Mining Company Operates Double-Duty Rock Crushing Plant

THE mining and milling operations of the Universal Exploration Co., Jefferson City, Tenn., are described in complete detail in a recent issue of the *Engineering and Mining Journal*.

This is an operation in which limestone and dolomite containing zinc blende is mined, crushed and screened prior to concentration by an oil flotation process and should be of interest to ROCK PRODUCTS readers.

A feature of the operation is that either zinc ore or marketable crushed stone can be produced in any desired ratio, using the same equipment. The concentrator is almost entirely automatic, which was accomplished largely by providing for a constant uniform feed and using equipment of ample capacity.

The deposit is blocky with some faults, in beds up to 80 ft. thick and is mined by benching and stoping, part being hand shoveled and part loaded through raises to cars below.

Three main levels are worked, at 91 ft., 117 ft. and 178 ft. respectively, below the surface, and the ore is hoisted in a main shaft 209 ft. deep. The ore is transported underground in 35-cu. ft. capacity ore cars of steel construction with round bottoms and 14-in. Timken roller bearing wheels. These are hauled by mules over 24-in. gage tracks and hoisted in cages to the surface, where the cars are pushed over a tipple and dumped to ore bins. The hoisting equipment comprises a 60-in. by 26-in. Hardie-Tynes double-drum hoist operating two cages and driven by a 100-hp. General Electric squirrel-cage motor.

Open cut or glory hole mining is also done at one point near the main hoisting shaft, where a space approximately 225 ft. by 400 ft. at the surface is thus worked. The 40-ft. clay overburden at this point was removed by a steam shovel. Raises were then driven up from the 117-ft. level, where the ore is drawn through chutes into the cars.

Above ground the ore is drawn from the bins through air-operated finger gates of 60 lb. rails to a 4-ton capacity side dump steel car, which is hauled up an inclined tramway to the crusher building. The tramway consists of a 30-in. gage track 705 ft. long on a 9% grade. At the crusher building the car is automatically dumped to a 30-ton steel hopper. The hoist is operated by remote control by an operator stationed at the dumping point.

The ore or rock is drawn from the hopper by a 4-ft. by 16-ft. Traylor heavy duty apron feeder which discharges to a 20-in. Traylor gyratory crusher. The crushed material falls to a 24-in. inclined belt conveyor leading to the top of the screen house, where any tramp iron is removed by an Ohio electric magnet opposite the head pulley.

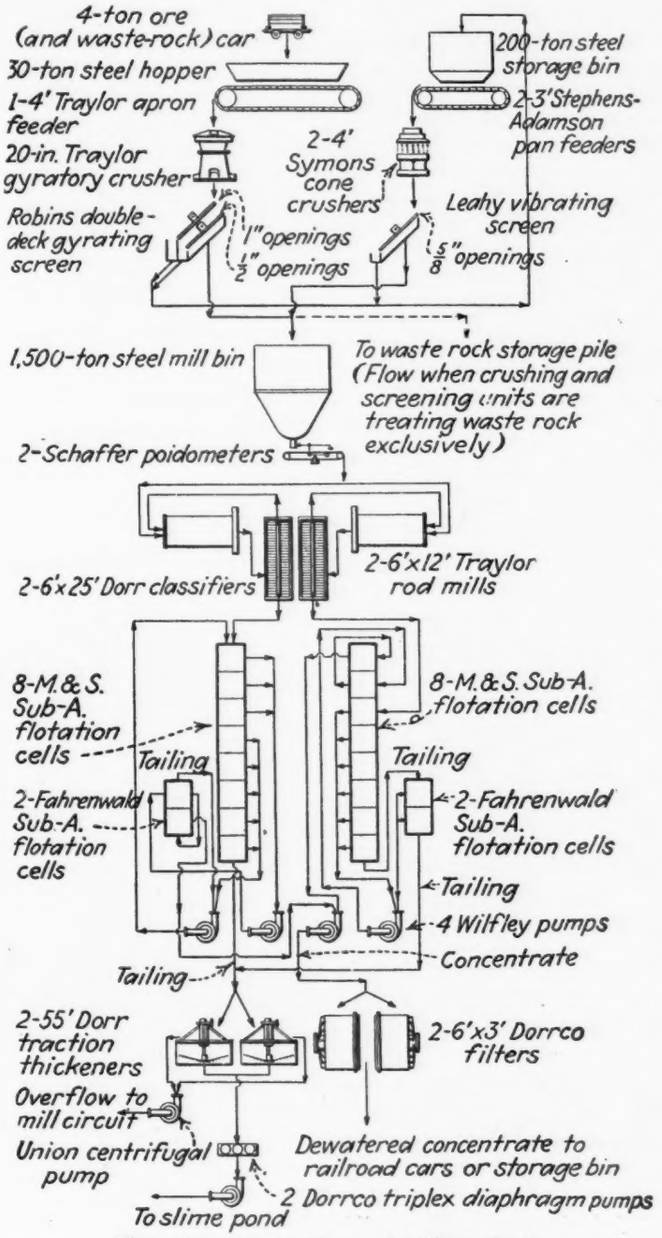
From the conveyor the material falls to a Robins double-deck gyrating screen with ½-in. mesh wire cloth below and a 1-in. mesh cloth above as a protection for the lower screen. The plus ½-in. material is returned on a 24-in. belt conveyor to a 200 ton capacity steel surge bin ahead of the recrushers. From this bin the material is fed to two Symons cone crushers, set for a 5/16-in. opening, by two 3-ft. by 14-ft. Stephens-Adamson pan feeders.

The product of the cone crushers is conveyed on a 24-in. belt to the top of the screen house and discharged to a Leahy vibrating screen, where any plus ⅝-in. material is scalped off and returned to the surge bin ahead of the recrushers.

The undersize of both screens is then conveyed on a 24-in. belt to a 1500 ton steel bin at the top of the mill building. From this bin the ore is fed by two Schaffer poidometers to two 6-ft. by 12-ft. Traylor rod mills operated in closed circuit with two 6-ft. by 25-ft. Dorr duplex classifiers.

From the classifiers the material is fed to two flotation circuits, the concentrate being pumped by a Wilfley pump to two 6-ft. by 3-ft. Dorrco filters. The dewatered product is carried by belt conveyor either direct to railroad cars or to a storage bin, while the tailings flow to two 55-ft. Dorr thickeners. The thickened product is pumped to the slime pond and the overflow returned to the mill water supply line.

Normally, 800 tons of ore is mined daily on two eight-hour shifts, with a total underground force of 80 men. The crusher and screening sections of the milling plant operate one nine-hour shift daily, and the rod mill and flotation sections three eight-hour shifts. Four men comprise the mill crew on each shift. One man is stationed in the rod mill section, another in the flotation section, one has charge of the sand pumps and




***Flow sheet of crushing and milling plants***
**Reprinted from "Engineering and Mining Journal"**

the feeding of reagents, and the fourth is a car loader stationed at the discharge of the belt conveyor that carries the dewatered concentrates.

Operating costs have steadily declined since the milling plant was placed in operation in May, 1930, even though a 1929 wage scale has been maintained. In March, 1931, during which month 19,130 tons of ore was mined and milled, costs per ton of ore were as follows: mining, 63.8c.; milling, 47.4c.; general, 20.8c.; total operating cost per ton of ore, $1.32. Plant breakdowns or delays in operation have been reduced to a minimum, the milling plant operating continuously for weeks at a time.

The milling plant, as already indicated, is unusual in many respects. All three buildings and connecting conveyor galleries are of steel and concrete construction throughout and are roomy and well lighted. Inasmuch as each piece of equipment is operated by an individual motor, the structures are entirely free of shafting. A system of illumination, in which Holophane reflectors are employed, provides improved working conditions at night, practically all shadows being removed. The floors consist largely of movable precast reinforced-concrete slabs. Moreover, all the materials used in the construction of the buildings, with the exception of the window lights, were supplied by other subsidiary companies of the U. S. Steel Corp.

LIME SOLD BY PRODUCERS IN THE UNITED STATES, 1929 AND 1930, BY USES

| Use | 1929 Short tons | 1929 Value | 1930 Short tons | 1930 Value |
|---|---|---|---|---|
| Agricultural | 338,329 | $ 2,387,901 | 343,111 | $ 2,372,779 |
| Building | 1,640,827 | 14,303,539 | 1,204,614 | 10,050,270 |
| Chemical: | | | | |
| Glass works | 75,283 | $ 544,760 | 62,912 | $ 408,429 |
| Metallurgy | 578,488 | 3,258,992 | 415,692 | 2,371,222 |
| Paper mills | 411,017 | 3,057,350 | 378,721 | 2,652,232 |
| Refractory lime (dead-burned dolomite) | 488,032 | 4,261,942 | 351,727 | 3,045,082 |
| Sugar refineries | 20,758 | 249,190 | 18,905 | 238,788 |
| Tanneries | 67,046 | 516,207 | 56,526 | 438,869 |
| Other uses | 649,988 | 4,898,967 | 555,672 | 4,038,815 |
| Total chemical | 2,290,612 | $16,787,408 | 1,840,155 | $13,193,437 |
| | 4,269,768 | $33,478,848 | 3,387,880 | $25,616,486 |
| Hydrated lime (included in above totals) | 1,550,771 | $12,771,525 | 1,329,562 | $10,357,445 |

# Sales and Distribution of Lime in 1930

DATA on the consumption of various liming materials for agricultural purposes in 1930 has been prepared by the National Lime Association.

In 1930 there were 238,071 tons less used than in 1929. This is largely accounted for by a reduction of 200,000 tons in Illinois.

Further comparison reveals that ground limestone and limestone screenings decreased 338,385 tons. On the other hand, the demand for hydrated lime and some of the miscellaneous materials, such as marl and by-product lime, increased 100,895 tons.

APPROXIMATE CONSUMPTION OF LIMING MATERIALS ON UNITED STATES FARMS DURING 1930

(Ton basis)
(Compiled by National Lime Association)

| State | Ground limestone | Limestone screenings | Burned lime | Hydrated lime | Marl | Miscellaneous materials (5) | Total liming materials | Effective lime oxides (6) | Pounds of lime oxides per acre of cropped land |
|---|---|---|---|---|---|---|---|---|---|
| (2) Maine | 1,500 | ..... | ..... | 5,764 | ..... | 1,500 | 8,764 | 5,535 | 6.6 |
| (1) New Hampshire | 5,500 | ..... | ..... | 500 | ..... | ..... | 5,500 | 2,850 | 10.5 |
| (3) Vermont | 6,028 | ..... | 1,110 | 130 | ..... | ..... | 7,268 | 4,049 | 7.0 |
| (4) Massachusetts | 30,315 | ..... | ..... | 18,034 | ..... | 7,987 | 56,336 | 31,876 | 93.0 |
| (3) Rhode Island | 381 | ..... | ..... | 825 | ..... | 70 | 1,276 | 804 | 21.1 |
| (1) Connecticut | 25,000 | ..... | ..... | 2,500 | ..... | ..... | 27,500 | 14,250 | 53.4 |
| New England | 68,224 | ..... | 1,110 | 27,753 | ..... | 9,557 | 106,644 | 59,364 | 25.6 |
| (4) New York | 162,810 | ..... | 3,450 | 25,390 | ..... | ..... | 191,650 | 102,111 | 22.5 |
| (4) New Jersey | 12,280 | ..... | 1,890 | 43,652 | ..... | 471 | 58,293 | 38,538 | 68.4 |
| (4) Pennsylvania | 116,202 | ..... | 27,395 | 87,783 | 1,935 | 8,960 | 242,275 | 148,283 | 35.2 |
| (4) Delaware | 455 | 154 | 3,808 | 12,095 | 50 | ..... | 16,562 | 12,010 | 46.4 |
| (4) Maryland | 2,040 | 600 | 10,222 | 22,348 | 734 | 105 | 36,049 | 25,881 | 23.2 |
| (4) West Virginia | 6,500 | ..... | 375 | 1,400 | 1,748 | ..... | 10,023 | 5,422 | 5.6 |
| Mid-Atlantic | 300,287 | 754 | 47,140 | 192,668 | 4,467 | 9,536 | 554,852 | 332,245 | 28.5 |
| (4) Ohio | 192,341 | ..... | ..... | 25,030 | ..... | 15,549 | 232,920 | 121,465 | 20.8 |
| (3) Indiana | 151,933 | ..... | ..... | 2,204 | 10,640 | ..... | 164,777 | 82,830 | 13.8 |
| (3) Illinois | ..... | 750,000 | ..... | ..... | ..... | ..... | 750,000 | 262,500 | 24.6 |
| (3) Kentucky | 260,000 | ..... | 4,000 | ..... | 30,000 | ..... | 294,000 | 143,900 | 42.1 |
| (3) Michigan | 27,594 | 63,495 | ..... | 9,895 | 25,000 | 10,000 | 135,984 | 56,697 | 11.7 |
| (4) Minnesota | 10,000 | 4,850 | ..... | ..... | 1,000 | 1,600 | 17,450 | 7,848 | 0.8 |
| (3) Iowa | ..... | 300,000 | ..... | ..... | ..... | 50,000 | 350,000 | 130,000 | 11.8 |
| (3) Kansas | 37,125 | 1,900 | ..... | ..... | ..... | ..... | 39,025 | 19,228 | 1.6 |
| (3) Missouri | 228,404 | ..... | ..... | ..... | ..... | ..... | 228,404 | 114,202 | 14.9 |
| Mid-Western | 907,397 | 1,120,245 | 4,000 | 37,129 | 66,640 | 77,149 | 2,212,560 | 938,670 | 13.3 |
| (1) Virginia | 71,250 | 9,500 | 23,750 | 9,500 | ..... | ..... | 114,000 | 65,788 | 24.5 |
| (2) North Carolina | 98,800 | ..... | 1,000 | 200 | ..... | ..... | 100,000 | 50,390 | 14.7 |
| (2) South Carolina | 12,000 | ..... | ..... | ..... | ..... | ..... | 12,000 | 6,000 | 2.4 |
| (2) Georgia | 5,000 | ..... | 35 | 50 | ..... | ..... | 5,085 | 2,565 | 0.5 |
| (2) Florida | 1,500 | ..... | 500 | 1,500 | ..... | ..... | 3,500 | 2,225 | 2.2 |
| (2) Tennessee | 332,500 | ..... | ..... | ..... | ..... | ..... | 332,500 | 166,250 | 43.8 |
| (2) Alabama | 10,615 | ..... | 65 | 20 | ..... | ..... | 10,700 | 5,377 | 1.4 |
| (2) Mississippi | 8,000 | ..... | ..... | 2,000 | ..... | ..... | 10,000 | 5,400 | 1.6 |
| (2) Arkansas | 5,000 | ..... | ..... | ..... | ..... | ..... | 5,000 | 2,500 | 0.7 |
| Southern | 544,665 | 9,500 | 25,350 | 13,270 | ..... | ..... | 592,785 | 306,495 | 10.3 |
| (4) California | 2,569 | ..... | ..... | 2,255 | 10,079 | 6,252 | 21,155 | 9,518 | 2.3 |
| (1) Oregon | 2,000 | ..... | ..... | ..... | ..... | ..... | 2,000 | 1,000 | 0.5 |
| (1) Washington | 4,000 | 3,000 | 300 | 1,000 | ..... | ..... | 8,300 | 4,005 | 1.3 |
| Western | 8,569 | 3,000 | 300 | 3,255 | 10,079 | 6,252 | 31,455 | 14,523 | 1.5 |
| Grand totals | 1,829,142 | 1,133,499 | 77,900 | 274,075 | 81,186 | 102,494 | 3,498,296 | 1,651,296 | |

States not listed have no figures available or use little or no liming materials.

(1) Figures estimated by agronomy department at state college.
(2) Figures partially estimated and partially obtained by county agent or producer survey.
(3) Figures obtained by county agent survey.
(4) Figures obtained from producers.
(5) Consists of ground shells, byproduct lime, etc.
(6) Computed on the following basis: 35% for limestone screenings and farm-dug marl; 50% for ground limestone, miscellaneous materials and commercial marl; 70% for hydrated lime and 85% for burned or quick lime.

THE LIME sold by producers in the United States in 1930 amounted to 3,387,880 short tons, valued at $25,616,486, according to figures obtained from a compilation of reports made by lime manufacturers to the United States Bureau of Mines, Department of Commerce. This represents a decrease of 21% in quantity and 23% in value as compared with 1929. Sales of hydrated lime, which are included in these figures, amounted to 1,329,562 tons, valued at $10,357,445, a decrease of 14% in quantity and of 19% in value. The average unit value of all lime showed a decrease from $7.84 a ton in 1929 to $7.56 in 1930, and that of hydrated lime a decrease from $8.24 a ton in 1929 to $7.79 a ton in 1930.

Sales of lime used in the manufacture of chemicals—1,840,155 tons, valued at $13,193,437—decreased 20% in quantity and 21% in value; lime for construction—1,204,614 tons, valued at $10,050,270—decreased 27% in quantity and 30% in value; and that sold for agricultural purposes—343,111 tons, valued at $2,372,779—increased slightly in value. The above table shows sales of lime by uses in 1929 and 1930.

### *Best States Showed Decrease*

Ohio, the largest producing state (736,305 tons, valued at $5,711,855 in 1930), showed a decrease of 23% in quantity reported, and Pennsylvania (633,520 tons, valued at $4,661,670 in 1930), decreased 19% in quantity. The total number of plants that reported operations in 1930 was 375, 6 less than in 1929. Although lime manufacturing plants are distributed throughout the United States, there is much interstate shipment, and the table on the opposite page shows the total sales, shipments into and from the different states, and their apparent and per capita consumption.

Of the hydrated lime sold by producers in the United States in 1930, Ohio produced 471,785 short tons (23% less than in 1929). Of this, 428,684 short tons (91%) was sold for construction and was widely distributed throughout the continental United States. The following table shows tonnage distribu-

tion of hydrated lime from plants in the United States and in Ohio, as reported to the Bureau of Mines, presented for blocks and contiguous states roughly comprising various freight-rate zones for 1929 and 1930:

SHIPMENTS OF HYDRATED LIME FROM PLANTS IN THE UNITED STATES AND IN OHIO; 1929-30, BY DESTINATIONS

| Destination—1929 | From all plants: Short tons | From all plants: Distribution (per cent.) | From Ohio plants: Short tons | From Ohio plants: Distribution (per cent.) | Group total (per cent.) |
|---|---|---|---|---|---|
| Illinois, Indiana, Michigan, Ohio | 389,273 | 25.1 | 274,269 | 44.6 | 70.5 |
| Delaware, D. C., Maryland, New Jersey, New York, Pennsylvania, West Virginia | 630,038 | 40.6 | 224,123 | 36.4 | 35.6 |
| Connecticut, Maine, Massachusetts, New Hampshire, Rhode Island, Vermont | 78,394 | 5.1 | 25,019 | 4.1 | 31.9 |
| Florida, Georgia, North Carolina, South Carolina, Virginia | 121,095 | 7.8 | 31,163 | 5.1 | 25.7 |
| Alabama, Kentucky, Louisiana, Mississippi, Tennessee | 75,673 | 4.9 | 18,314 | 3.0 | 24.2 |
| Arkansas, Iowa, Kansas, Minnesota, Missouri, Nebraska, Oklahoma, Texas, Wisconsin | 179,948 | 11.6 | 31,663 | 5.1 | 17.6 |
| Arizona, California, Colorado, Idaho, Montana, Nevada, New Mexico, North Dakota, Oregon, South Dakota, Utah, Washington, Wyoming | 60,753 | 3.9 | 2,998 | .5 | 5.0 |
| Undistributed and exports | 15,597 | 1.0 | 7,523 | 1.2 | 48.2 |
| | 1,550,771 | 100.0 | 615,072 | 100.0 | 39.7 |
| 1930 | | | | | |
| Illinois, Indiana, Michigan, Ohio | 297,068 | 22.3 | 200,238 | 42.4 | 67.4 |
| Delaware, D. C., Maryland, New Jersey, New York, Pennsylvania, West Virginia | 562,678 | 42.3 | 181,591 | 38.5 | 32.3 |
| Connecticut, Maine, Massachusetts, New Hampshire, Rhode, Island, Vermont | 71,182 | 5.4 | 22,040 | 4.7 | 31.0 |
| Florida, Georgia, North Carolina, South Carolina, Virginia | 103,144 | 7.8 | 20,553 | 4.4 | 19.9 |
| Alabama, Kentucky, Louisiana, Mississippi, Tennessee | 51,076 | 3.8 | 12,869 | 2.7 | 25.2 |
| Arkansas, Iowa, Kansas, Minnesota, Missouri, Nebraska, Oklahoma, Texas, Wisconsin | 169,610 | 12.8 | 23,892 | 5.1 | 14.1 |
| Arizona, California, Colorado, Idaho, Montana, Nevada, New Mexico, North Dakota, Oregon, South Dakota, Utah, Washington, Wyoming | 57,416 | 4.3 | 2,901 | .6 | 5.1 |
| Undistributed and exports | 17,388 | 1.3 | 7,701 | 1.6 | 44.3 |
| | 1,329,562 | 100.0 | 471,785 | 100.0 | 35.5 |

LIME SUPPLIES AVAILABLE FOR CONSUMPTION IN CONTINENTAL UNITED STATES IN 1930, BY STATES, IN SHORT TONS

| State | Sales by producers | Shipments from state | Shipments into state | Supply: Hydrated lime | Supply: Quicklime | Supply: Total | Lb. per capita |
|---|---|---|---|---|---|---|---|
| Alabama | 164,822 | 45,804 | 9,430 | 11,976 | 116,472 | 128,448 | 97 |
| Arizona | 35,642 | 11,139 | 74 | 2,002 | 22,575 | 24,577 | 113 |
| Arkansas | 30,349 | 18,786 | 2,735 | 4,775 | 9,523 | 14,298 | 13 |
| California | 51,302 | 5,895 | 30,875 | 23,660 | 52,622 | 76,282 | 27 |
| Colorado | 6,777 | 754 | 6,816 | 6,178 | 6,661 | 12,839 | 25 |
| Connecticut | 28,489 | 18,769 | 18,522 | 12,450 | 15,792 | 28,242 | 34 |
| Delaware | ..... | ..... | 39,632 | 15,652 | 23,980 | 39,632 | 333 |
| District of Columbia | ..... | ..... | 13,977 | 11,667 | 2,310 | 13,977 | 58 |
| Florida | † | ..... | † | 16,429 | 8,871 | 25,300 | 35 |
| Georgia | 7,455 | 1,741 | 21,456 | 21,313 | 5,857 | 27,170 | 19 |
| Idaho | 2,463 | 1,286 | 1,122 | 596 | 1,703 | 2,299 | 10 |
| Illinois | 89,709 | 44,051 | 137,934 | 68,326 | 115,266 | 183,592 | 48 |
| Indiana | 87,965 | 52,604 | 44,351 | 44,412 | 35,300 | 79,712 | 49 |
| Iowa | ..... | ..... | 48,161 | 17,568 | 30,593 | 48,161 | 39 |
| Kansas | ..... | ..... | 33,014 | 19,245 | 13,769 | 33,014 | 35 |
| Kentucky | † | † | 38,068 | 10,293 | 29,636 | 39,929 | 30 |
| Louisiana | ..... | ..... | 63,079 | 8,186 | 54,893 | 63,079 | 43 |
| Maine | 66,775 | 20,919 | 22,188 | 15,002 | 53,042 | 68,044 | 170 |
| Maryland | 53,090 | 21,137 | 75,766 | 52,572 | 55,147 | 107,719 | 132 |
| Massachusetts | 107,502 | 79,622 | 49,567 | 30,775 | 46,672 | 77,447 | 36 |
| Michigan | 80,241 | 36,969 | 104,871 | 60,521 | 87,622 | 148,143 | 61 |
| Minnesota | † | † | 10,345 | 12,273 | 11,410 | 23,683 | 18 |
| Mississippi | ..... | ..... | 17,237 | 5,635 | 11,602 | 17,237 | 17 |
| Missouri | 265,771 | 194,099 | 9,944 | 31,277 | 50,339 | 81,616 | 45 |
| Montana | † | ..... | † | 2,059 | 7,398 | 9,457 | 35 |
| Nebraska | ..... | ..... | 11,816 | 8,280 | 3,536 | 11,816 | 17 |
| Nevada | † | † | 1,584 | 1,040 | 1,194 | 2,234 | 49 |
| New Hampshire | ..... | ..... | 11,752 | 3,560 | 8,192 | 11,752 | 51 |
| New Jersey | † | ..... | † | 93,173 | 43,159 | 136,332 | 68 |
| New Mexico | 2,369 | 400 | 10,385 | 1,525 | 10,829 | 12,354 | 58 |
| New York | 83,078 | 30,400 | 293,261 | 169,284 | 176,655 | 345,939 | 55 |
| North Carolina | † | † | 37,656 | 27,898 | 13,724 | 41,622 | 26 |
| North Dakota | ..... | ..... | 7,020 | 5,263 | 1,757 | 7,020 | 21 |
| Ohio | 736,305 | 496,345 | 77,493 | 123,969 | 193,484 | 317,453 | 96 |
| Oklahoma | † | ..... | † | 13,794 | 9,161 | 22,955 | 19 |
| Oregon | 1,741 | 632 | 7,446 | 3,769 | 4,786 | 8,555 | 18 |
| Pennsylvania | 633,520 | 239,928 | 204,972 | 204,971 | 393,593 | 598,564 | 124 |
| Rhode Island | 2,638 | 214 | 15,134 | 8,174 | 9,384 | 17,558 | 51 |
| South Carolina | ..... | ..... | 9,475 | 5,770 | 3,705 | 9,475 | 11 |
| South Dakota | † | ..... | † | 2,302 | 1,890 | 4,192 | 12 |
| Tennessee | 147,648 | 93,553 | 9,174 | 14,986 | 48,283 | 63,269 | 49 |
| Texas | 74,081 | 22,033 | 4,172 | 33,493 | 22,727 | 56,220 | 19 |
| Utah | 27,522 | 1,955 | 369 | 4,549 | 21,387 | 25,936 | 103 |
| Vermont | 45,963 | 43,193 | 1,277 | 1,221 | 2,826 | 4,047 | 23 |
| Virginia | 146,996 | 100,794 | 37,014 | 31,734 | 51,482 | 83,216 | 69 |
| Washington | 26,913 | 7,481 | 4,433 | 3,543 | 20,322 | 23,865 | 31 |
| West Virginia | 228,230 | 192,517 | 37,554 | 15,359 | 57,908 | 73,267 | 85 |
| Wisconsin | 64,989 | 27,830 | 63,564 | 29,005 | 71,718 | 100,723 | 69 |
| Wyoming | † | ..... | † | 770 | 343 | 1,113 | 10 |
| Undistributed | 70,180 | 32,229 | 181,213 | ..... | ..... | ..... | ..... |
| | 3,370,525 | ‡1,843,079 | 1,825,928 | 1,312,274 | 2,041,100 | 3,353,374 | 55 |

*Based on Bureau of the Census preliminary statement.
†Included under "Undistributed."
‡Includes 17,251 tons of lime exported or unspecified by producers as to destination.

## Data on Turquoise

THE FINEST GRADE of turquoise comes from Persia, notable from Nishapur, says a recent information circular, 6491, issued by the U. S. Bureau of Mines. Large quantities have been mined in the southwestern states of the United States, and less important deposits have been found in a number of the other states.

According to J. E. Pogue the following are the three modes of occurrences: In acid igneous rocks rich in alkalic feldspars and considerably altered by weathering or deep-seated alteration, or both; in sedimentary or metamorphic rocks near the contact with igneous masses; and in a nonigneous matrix (usually sandstone or shale).

Detailed information on description and properties, uses, substitutes, history and the location of known world occurrences, as well as production methods and markets are contained in this circular.

## Opals

PRODUCTION statistics on opals for the United States since 1921 are not available, as the U. S. Geological Survey discontinued the survey of producers at that time. Opal-bearing deposits have been discovered in Nevada and Washington in recent years. Other states in which deposits are located are North Carolina, New Mexico, Idaho, California, Oregon and Texas.

Opal occurs as a secondary deposit in fissures in many kinds of rocks, especially in recently erupted lavas, as well as in petrified wood and other fossil material. According to Dana it fills cavities and fissures or seams in igneous rocks, also in some metallic veins; and is embedded, like flint, in limestone, and sometimes, like other quartz concretions, in clay. It is also formed from the siliceous waters of hot springs, and results from the mere accumulation, or accumulation and partial solution and solidification, of the siliceous shells of infusoria, of sponge spicules, etc., which consist essentially of opal-silica.

Much detailed information on opals is contained in U. S. Bureau of Mines Information Circular 6493.

## Arthur Brisbane Bares Clay Brick Chicanery

IT IS TO BE HOPED that the last paragraph of Arthur Brisbane's editorial "Today" (September 29), a feature of Hearst morning papers everywhere, will not be overlooked. It reads:

"Those interested in the cement industry should know that ingenious manipulation of New York City's new building code, now planned, would prevent the use of cement bricks and blocks, without adding anything to safety. The clay brick makers are also interested, for if they can exclude cement bricks and blocks from competition it will be easy for them to increase the price of brick and add to the cost of building."

# Modernizing Sand and Gravel Production

## McGrath Sand and Gravel Co., at Chillicothe, Ill., Replaces Old with a New and Modern Plant

*Dredge working in new location*

THE recently completed sand and gravel washing plant of the McGrath Sand and Gravel Co. at Chillicothe, Ill., is an excellent example of the continual improvement and modernization of plants in the rock products industry.

The new plant does not add to the production capacity of the company but was constructed to replace an older plant which had been operated for more than ten years and had become obsolete.

The old plant, which was of timber construction, was described in ROCK PRODUCTS, October 11, 1930, and at that time the plans for the new plant were also mentioned. These were drawn up and most of the equipment was furnished by the Link-Belt Co. The whole thing was worked out so that the change from the old to the new could be made without interfering with production.

The new plant is of concrete and steel construction, consisting of five reinforced concrete silos with a superstructure of steel and with steel conveyor galleries. The steel work was furnished by the Mississippi Valley Structural Steel Co.

The new plant is located alongside the old one but on the opposite side of the loading track and as at present operated has a production capacity of about 350 tons per hour. However, provision has been made for doubling this, if desired at any time, by adding duplicate screen equipment in space left for that purpose.

The first step in working out the new arrangements was the construction of the main inclined conveyor which was to carry the raw material to the new plant. This was put in last year. It consists of a 36-in. belt conveyor 550 ft. long on centers extending from a loading bin at ground level to a point above the new plant. It is carried on a steel gallery and on steel bents entirely independent of any other structure, and the material is discharged at a point high enough to flume across to the old plant.

In this way the new conveyor was of considerable help in the construction of part of the new layout, as it was used to carry up and put through the old plant the sand and gravel which had to be excavated to provide a place for the lower conveyor leading from the dewatering point to the main inclined conveyor.

A mast for the operation of a dragline scraper was installed beside the loading bin at the foot of the inclined conveyor and the scraper was used to excavate the trench and deposit the material in the wooden loading bin.

This first conveyor, 30 in. wide by approximately 500 ft. long on centers, and on a slope of about 7 deg., carries the material from the dewatering point at the edge of the lake to the main inclined conveyor.

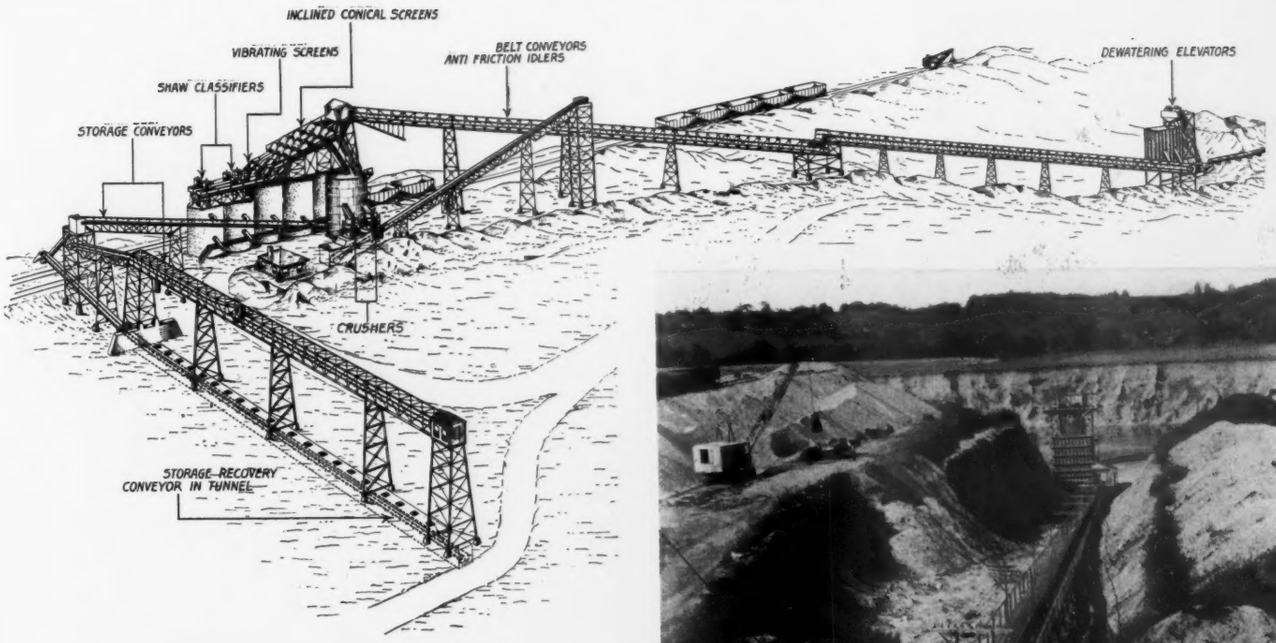
Both conveyors have Timken roller bearing idlers and are driven by General Electric motors through Link-Belt silent chain drives. A 100-hp. motor is used on the main inclined belt conveyor and a 50-hp. motor on the lower conveyor.

### *Dredging*

The same dredge is used for excavating as in the previous operation of the old plant, having dug its way around the end of the car storage tracks to the new location. It contains a Pettibone and Mulliken 15-in. pump driven by a 400-hp. Allis-Chalmers slip-ring motor.

The dredge discharge line is carried on pontoons to a two-compartment concrete sump located on shore, from which the material is carried up and discharged in to the conveyor loading bin by two 30-in. Link-Belt dewatering elevators, the overflow water being flumed back to another

*General view of plant of McGrath Sand and Gravel Co. at Chillicothe, Ill.*




***Perspective drawing of the plant***

***Lower conveyor with dewatering elevators in distance***

part of the lake. The loading bin is of timber construction and will hold about 200 tons of material. As in the other part of the lake approximately 90 ft. of material is excavated, 60 ft. above water and 30 ft. below. A washdown jet is used for caving the material in order to keep the suction conditions as nearly uniform as possible and a Swintek traveling chain screen and cutter is used on the suction line.

### *Washing and Screening Plant*

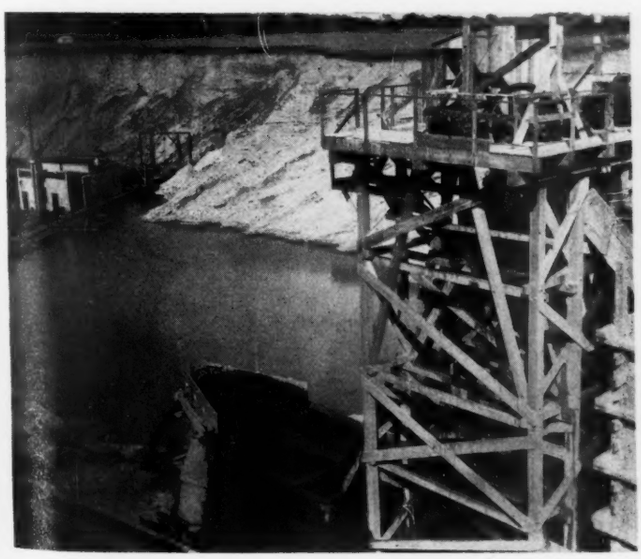
Five reinforced concrete silos 24 ft. in diameter and with 8-in. walls are used as loading bins. Three of these are used for gravel and are 54 ft. high. The other two, which are used for sand, are 44 ft. high.

Above these silos and in part supported on them is a structural steel frame carrying the screens and classifiers.

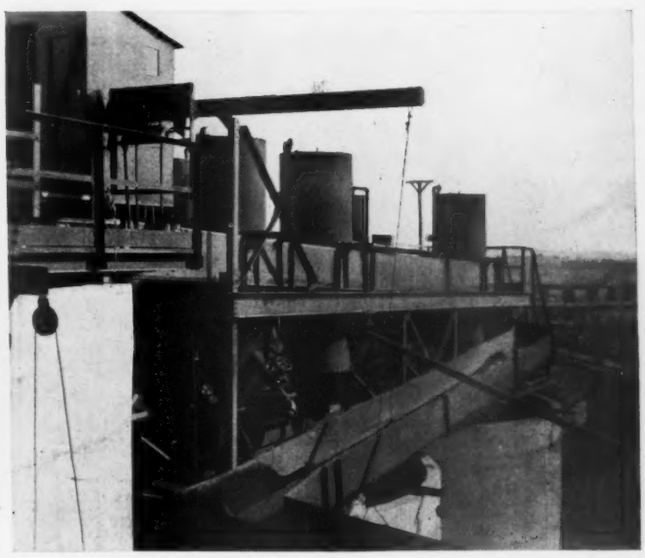
The material discharged from the main belt is split to two steel hoppers constructed so that each can again divide the stream of material to two screens, thus provided for four parallel rows of screens. At the present time only the two inside rows are installed.

Each row consists of four Link-Belt conical screens in series on the slope. Each screen is 36 in. in diam. at the discharge end, 72 in. in diam. at the feed end, and 96 in. long. Beginning at the upper end the screens have respectively 2½-in., 1¼-in., ¾-in. and ½-in. (¼-in. at present on one side) perforations. Both rows are driven through gearing and a silent chain drive by one motor.

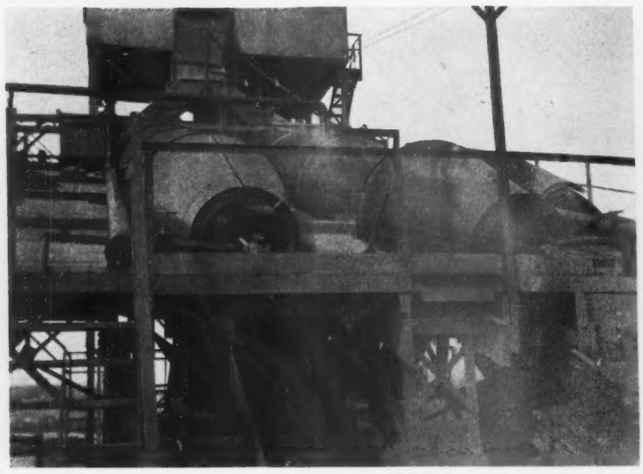
Water is added in the hopper feeding each row of screens and additional wash

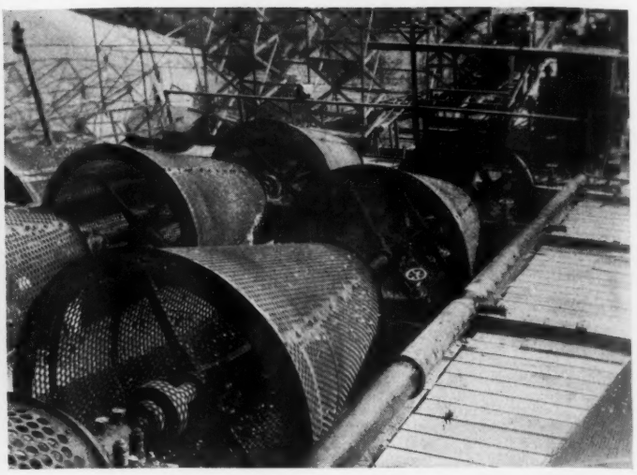


***Dredge discharge to sump at dewatering elevators***



***Sand classifiers, showing waste flume below***





*Looking at the double row of conical screens from opposite ends*

water is sprayed on the material in the three lower screens of each row.

The top screen of each row acts as a scalper to remove any oversize. This oversize is spouted to a steel tank alongside, crushed, and returned to the main belt conveyor.

Arrangements are made for two vibrating screens following the conical screens, but only one of these has been installed. It is a 4-ft. by 8-ft. Link-Belt single deck vibrating screen equipped with ¼-in. mesh wire cloth.

The sand from the last screens along with some additional water is flumed to two parallel rows of Shaw classifiers consisting of three classifiers in each row, one 30-in. and two 36-in. The location of the screens and classifiers with respect to the silos is shown in one of the illustrations.

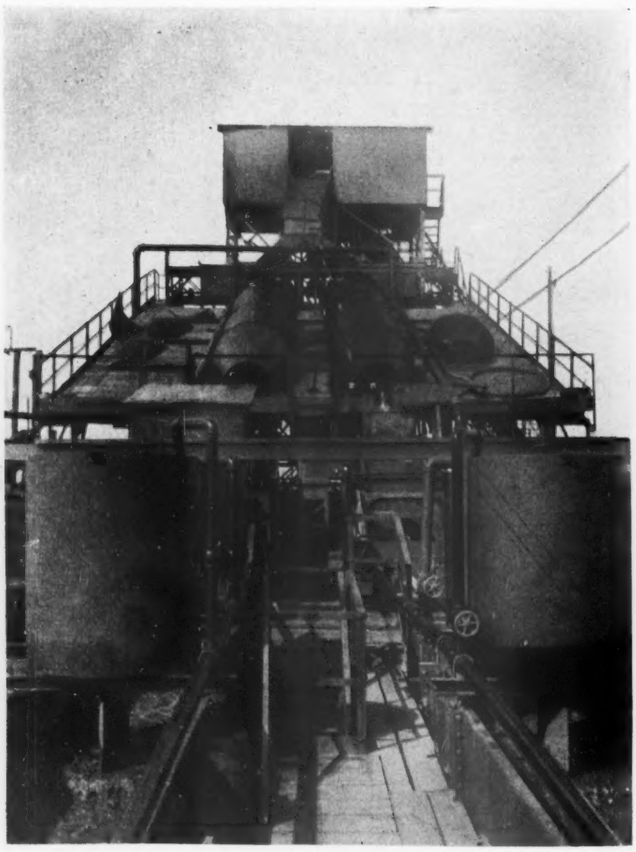
The water for washing is provided by two 8-in. American Well Works centrifugal pumps each driven by a 75-hp. motor. This is obtained from wells dug in the gravel formations of the old washings.

The oversize from the first screen is spouted to a steel tank approximately 20 ft. in diam. and 40 ft. high, located alongside the plant, from which it is fed to a 4-ft. Symons cone crusher and returned to the main belt on a 24-in. inclined belt conveyor.

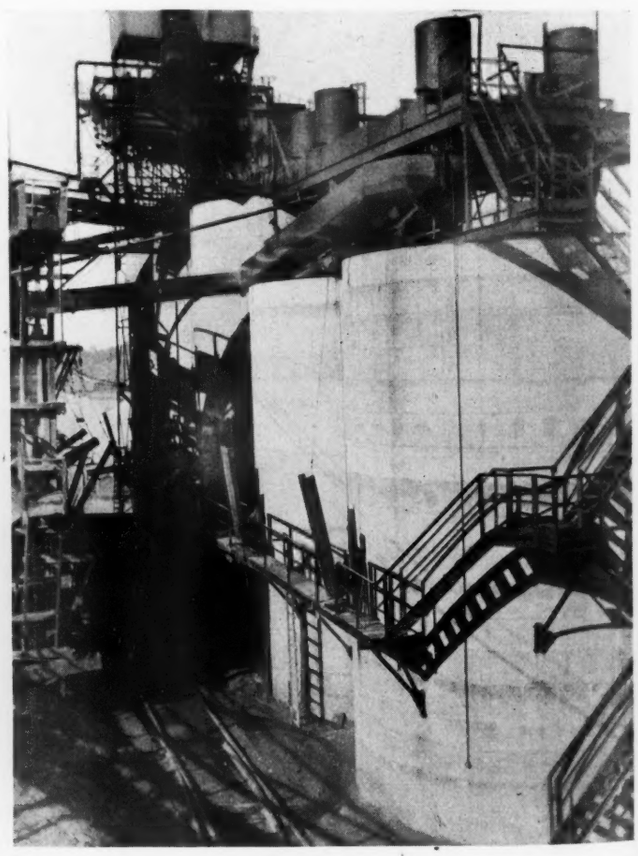
### *Loading*

The arrangements are such that the three gravel sizes can be passed over vibrating screens to remove any fines and water as they are being loaded to railroad cars.

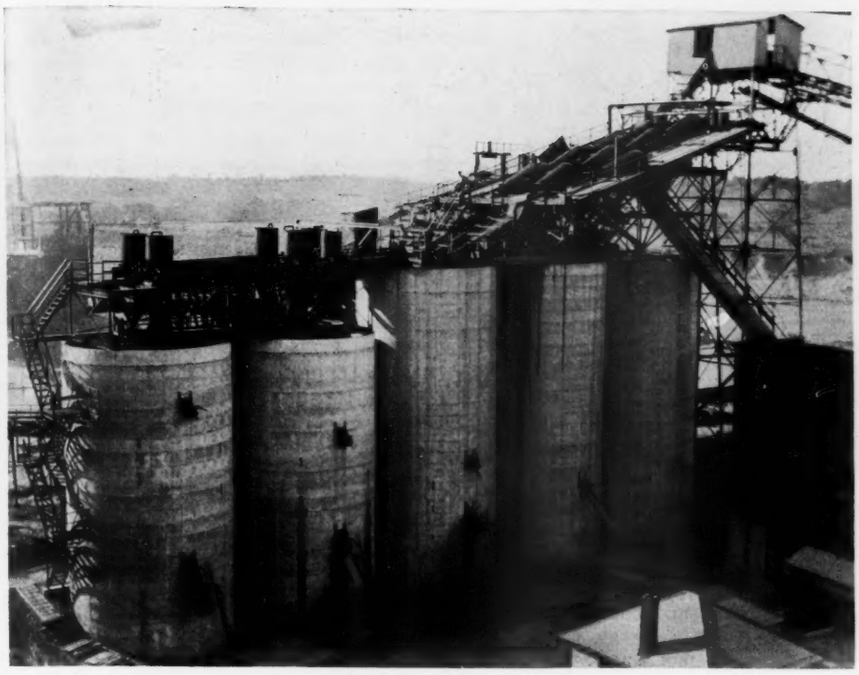
This is accomplished by having a 3-ft. by 5-ft. vibrating screen in the angle be-



*Looking along top of screen floor*



*End view of plant*



*Side view of silos and screens*

tween the first and second silo and another between the second and third silo. Thus either one or two sizes may be drawn over the screen and rewashed and drained while loading. Additional gates and spouts with a perforated section also provide for loading in the usual manner.

On the side opposite the car loading track the silos are arranged with gates so that each size may be loaded direct to trucks. An additional set of gates were also installed on this side so that the various sizes may be fed to an inclined conveyor to be installed later, the intention being to carry the material in this way from the silos to an additional car loading point or to the storage pile.

The storage system, which was installed about five years ago and which was described in Rock Products, June 25, 1927, consists of an overhead belt and tripper discharging to a pile from which the material is reclaimed through a tunnel below. The overhead belt is 24 in. wide by 510 ft. long on centers and is supported on a steel gallery carried on steel bents over three spans of 110 ft. each. The tunnel conveyor is 24 in. wide by 400 ft. long and discharges to an inclined belt conveyor of the same width and 125 ft. long, which in turn discharges directly to cars.

The general offices of the company are at Lincoln, Ill., and other plants are also operated at Forreston, Mackinaw and Pekin, Ill. J. W. McGrath is president; T. E. McGrath is vice-president; and Fred J. Larcher is superintendent at Chillicothe.

## Petitions for Reconsideration of Rate Increase on Silica Sand

CONTENDING that the Interstate Commerce Commission erred when it prescribed a higher basis of rates for silica sand when shipped in box cars than when in open top equipment, a group of southwestern glass manufacturers has petitioned the commission to reopen for further consideration on the present record its docket 17,000, part 11 and 11-A, involving rates on sand.

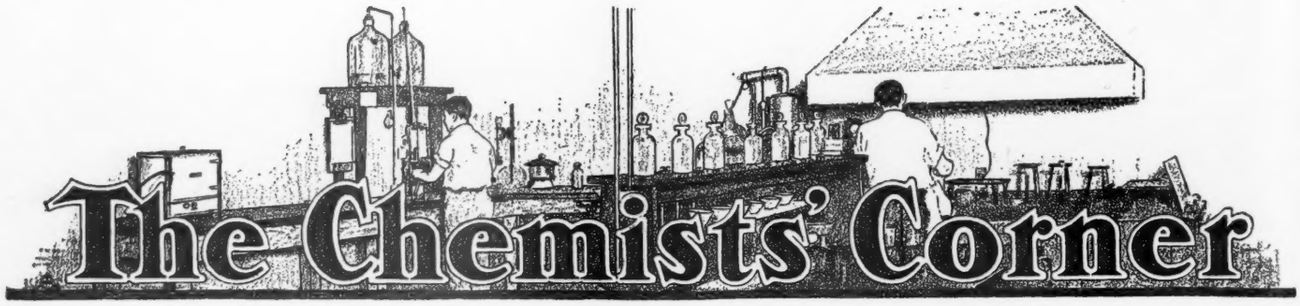
The petition said the commission's decision would result in freight rate increases on silica sand ranging from 1 to 50% and averaging 25%.

The petitioners pointed out that the proceeding, which involves rates on sand between many points in the United States, was a general investigation instituted by the commission. Stating that the commission went outside the record in its finding for a higher basis on silica sand when in box cars, the petition declared the decision indicated that "because this sand is to be used by a glass plant and for the manufacture of glass in some instances, and because it is white and fine, it must pay a penalty."

Protesting that the decision penalized silica sand, the petition said the commission, to be consistent, should order a similar penalty for other commodities using box cars.

*Dewatering elevators*

*Part of storage pile, with conveyors*




# A Method for Determination of Cement Fineness

By C. F. Pinkerton
Chief Chemist, Idaho Portland Cement Co., Inkom, Idaho

SIEVING CEMENT for fineness is a process involving the personal equation to a considerable extent. For that reason a method to determine cement fineness was developed with the idea of producing a result of fair accuracy and as rapidly as possible, consistent with accuracy. Comparable results among several operators are necessary, but where the operator is both mix chemist and physical tester the standard method of fineness requires too much time for regular routine samples.

The standard method of determining cement fineness requires that the sample be sieved until not more than 0.05 gm. will pass through in one minute of continuous sieving. In other words, the end-point is reached by means of a residue weight limit. The method given here is based on a definite time limit of sieving and when uniformly followed gives results which are not outside the variation limits of sieving by the standard method.

The procedure is as follows: Place 20 gm. of cement on the 200-mesh sieve and, with pan and cover attached, sieve for 5 min. using an interval timer. Remove sieve bottom, clean the under surface of the sieve by brushing and dislodge dust by tapping the side of the sieve with the brush. Replace the bottom and sieve again for 3 min. Repeat the operation of cleaning the sieve. Replace bottom and sieve for 1 min. Repeat cleaning and then sieve again for 1 min. Weigh the residue, apply the correction factor and record results. Note that during the sieving operation the sieve cover has not been removed.

The operation of sieving is performed by holding the sieve in a horizontal position on the knee, striking the side of the sieve gently about 150 times per minute with the left hand in such manner as to also turn the sieve approximately 1/6 of a revolution. The right hand is used to guide the sieve and complete the partial revolution.

That this method will give reliable and uniform results is illustrated by the following examples:

TEST RESULTS WITH METHOD DESCRIBED

First Operator

| | | | |
|---|---|---|---|
| Test No. 1. | 3.50 gm. res. weight | × 5 = | 17.50 |
| Test No. 2. | 3.54 gm. res. weight | × 5 = | 17.70 |
| Test No. 3. | 3.54 gm. res. weight | × 5 = | 17.70 |
| Test No. 4. | 3.59 gm. res. weight | × 5 = | 17.95 |
| Average | | | 17.71 |
| True fineness | | | 17.10 |
| Correction factor | | minus | 0.61 |

Second Operator

| | | | |
|---|---|---|---|
| Test No. 2. | 3.75 gm. res. weight | × 5 = | 18.75 |
| Test No. 3. | 3.77 gm. res. weight | × 5 = | 18.85 |
| Test No. 5. | 3.78 gm. res. weight | × 5 = | 18.90 |
| Test No. 6. | 3.75 gm. res. weight | × 5 = | 18.75 |
| Test No. 7. | 3.77 gm. res. weight | × 5 = | 18.85 |
| Average | | | 18.82 |
| True fineness | | | 17.10 |
| Correction factor | | minus | 1.72 |

Application of these correction factors by the operators to their regular routine samples has given reliable results, the calculated average of a 24-hour period consistently checking within 0.3 of the true fineness of the composite.

Because of the personal equation entering into the recorded result each operator must have his own correction factor rather than a common correction factor for the sieve to be applied by any operator. Observation should be made of the points of caution listed in the circular sent out by the Bureau of Standards with their standard samples of cement.

# Content and Soundness of Cement With Raw Materials High in $SO_3$

By Katsuzo Koyanagi
Chichibu Cement Co., Ltd., Tokyo, Japan

IN the "Chemists' Corner" of the April issue of Rock Products, Alton J. Blank has an article "Some Observations and Data in Connection with the Manufacture of Portland Cement from Raw Materials and Fuels High in Sulphur Content," in which he refers to my articles on ignition loss and effect of sulphate vs. sulphide in the raw material published in the Chemists' Corner of the August 16 and September 13, 1930, issues of Rock Products.

In the beginning of the article Mr. Blank says that all data presented in my article "Effect of Sulphate vs. Sulphide in the Raw Material on the Strength of the Portland Cement," in the September 13, 1930 issue, were derived from tests performed on a laboratory scale of experimentation.

In reply to this I would like to state that our laboratory rotary kiln is of such size, 40 mm. and 56 mm. in diameter by 7 meters in length, that it gives results comparable to this commercial product. All data obtained in the work with this kiln can, from our experience, at once be put into practice in commercial kilns with great reliability. Especially, when the effect of some injurious materials on cement burning is to be examined, the test kiln surpasses the commercial kiln in every point.

In that article Mr. Blank also gave data on his experience in burning cement with

fuel oil containing a great quantity of sulphur (4—7% S), and raw materials of high content of sulphate sulphur. He oftimes obtained from these materials unsound cements. Analyses of a number of these unsound cements showed high sulphur (sulphide) content (no quantitative data were given) to be present.

We also have made cement out of raw materials high in sulphate content of which analyses were given in the September 13, 1930, issue of Rock Products, using powdered coal of low sulphur content as fuel. The content of sulphur trioxide in the kiln feed mixture was as high as in the case cited by Mr. Blank, being 0.80—0.88%. The powdered coal had the following composition:

| $H_2O$ | Volatile matter | Fixed carbon | Ash | Sulphur |
|---|---|---|---|---|
| 1.79% | 41.23% | 47.50% | 9.48% | 0.20% |
| 1.31% | 40.91% | 50.57% | 7.21% | 0.29% |

The atmosphere in the kiln was kept oxidizing at all times (with ½% by volume of oxygen in the flue gas), and the clinker was burnt very hard.

We always obtained completely sound cement from these raw materials although the strengths of the cement were much lower than those of cement out of ordinary sulphurless raw materials. Analyses of a number of these cement clinkers showed a comparatively high content of $SO_3$, but no sulphur (sulphide). In some extreme cases the $SO_3$ content of clinker went over 4%, but the cement was quite sound both in water and boiling tests.

From our experience, even if the raw materials low in sulphate are used, underburnt cement which contains much free lime and is unsound, is always higher in $SO_3$ content than normally burnt sound cement. But the $SO_3$ in the clinker is not the factor, which makes cement unsound, because as stated above, the cement clinker made of raw materials high in sulphate content, though it contains much $SO_3$, gives satisfactorily sound cement, if it is burnt normally.

These tests indicate that, if the atmosphere in the kiln is kept completely oxidizing the sulphate sulphur in the raw materials affects the soundness of cement little, though it harms the strength very much.

In reading the article by Mr. Blank, it is difficult to decide whether the sulphide sulphur, which is present in the finished cement and causes unsoundness, comes from the fuel rich in sulphur, or from the sulphate in the raw materials through reduction. I think, from the results of our experiments, this comes perhaps from the former origin.

In conclusion, the process which was reported in the article "Effect of Sulphate vs. Sulphide," in the September 13, 1930, issue of Rock Products, is one of the methods which, after much experimentation both in test and commerical kilns, I found very effective for driving off the sulphate sulphur in the raw materials during burning, thus eliminating the injurious action of sulphate on the strength of cement. We obtained a patent for this process in the Japanese patent bureau. This is Japanese patent No. 88623.

## Boron and Its Compounds

THE CHIEF COMPOUNDS of boron are borax and boric acid, both of which have important applications in industry. Amorphous boron is produced by the action of potassium on boric acid. Owing to its finely divided condition when produced, it is apt to take fire spontaneously; but if consolidated by pressure it is not affected by air at ordinary temperatures.

Boron is not a particularly rare element. Workable deposits are quite uncommon, but the element is widely distributed in small amounts.

In industry borax has a considerable number of extremely important applications. It is of great value as a flux. In glass boron compounds impart a high refractiveness, reduce the tendency to devitrification and lower the coefficient of expansion. It is used in the laundry and kitchen. In the citrus industry it is used as a preservative, as well as in the rubber industry. The tanning industry uses borax as well as boric acid in the preparation of leather. The textile industry utilizes it in dyeing. It is an effective larvicide. It is used in the manufacture of certain chemicals and in the production of glass.

Crude borate minerals are mined in a number of countries. These countries, in the order of their importance, are the United States, Chile, Turkey, Italy, Argentina, Peru and Germany.

In the United States, up until several years ago, the commercial source of boron derivatives were almost entirely from colemanite and, to a lesser extent, ulexite. Some crude natural borax, known as tincal, has been mined, and quite a large amount of borax is now being produced from natural brines as a byproduct of the potash industry at Searles Lake, Calif.

Most of the principal deposits of colemanite and ulexite in the United States are found in Inyo county, Calif., and Churchill county, Nev., and prior to the discovery of rasorite these minerals, together with the brines from Searles Lake, furnished the domestic requirements for borax and boric acid.

Some years ago during the search for potash the value of the Searles Lake deposits became apparent, and after considerable research an economical process was formulated for the production of both potash and borax.

Borax has been produced from several minerals, each requiring somewhat different methods of preparation, but on the whole the processes are always essentially simple.

The crude mineral is first calcined, which has the effect of changing the colemanite into a fine powder without affecting the other minerals present.

The finely powdered colemanite may then be readily separated from the other minerals by mechanical means. The colemanite is boiled with a solution of soda, thus forming a solution of borax and an insoluble residue of calcium carbonate. The solution is then filtered and the borax recovered by crystallization.

The production and consumption of borate minerals have increased rapidly in recent years. The United States is by far the largest source of these minerals, with Chile now ranking a remote second, with only about 12% of the American output. Turkey is third and Italy fourth.

As the United States production and exports have increased, foreign production of borax has constantly decreased.

The imports of boron minerals and refined borax are quite small. Imports of crude borate minerals have tended markedly to increase during the last few years despite the rapid growth in production and exports. Prior to 1914, exports of borax from the United States were small, but during the World War a substantial business developed with Europe. In recent years exports amounted to approximately one-half the domestic output. The exports consist principally of refined borax, although crude borate materials are also shipped.

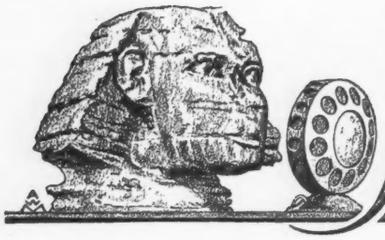
In recent years competition of by-product borax with rasorite, as well as more or less severe competition between the larger producers in California, has resulted in great uncertainty in the price of borax, there being practically no standard price at present.

Unusual as it may seem, the price situation has had little or no apparent effect upon production and sales of borax in this country, while the exports of crude borax have increased greatly in recent years.

The above information is summarized from detailed information and statistics contained in U. S. Bureau of Mines Information Circular 6499. Data are also given on boric acid in this circular.

## Plans New Rock Crushing Plant in Florida

FLORIDA TRAP ROCK PRODUCTS CO., Zephyrhills, Fla., plans erection of a new rock-crushing, storage and distributing plant near Zephyrhills, with installation of crushing, conveying, loading and other handling equipment. A power house with Diesel engine and accessory equipment will be built. The project will cost more than $40,000. A description of this project was published in the June 6 issue of Rock Products.



# Hints and Helps for Superintendents

## Screening Practice and Disposal of Fines and Impurities

THE Linwood Cement Co., Davenport, Ia., passes its stone through the primary crusher after which fines are taken out at once, for at this point what fines there are consist of soil and other foreign matter. So instead of dragging all this dead material

***Conveyor mounted on turntable***

through the plant they get rid of the impurities early in the process.

Under the screens that remove this fine material they have mounted what was previously a portable Barber-Green belt conveyor on an old truck wheel which serves as a turntable for the conveyor. In this way the strippings may be loaded to gondolas for shipment or to the stock pile beside the track. The amount of material that the conveyor handles varies depending upon the dryness of the stone and upon the part of the quarry from which it was taken.

## Coating Belts to Save Wear

By W. E. Warner
Herts, England

ONE of our belts, made of stitched cotton, 150 ft. long, working at a speed of 200 ft. per minute, sometime ago showed signs of severe wear. The belt in question was conveying broken granite, which material is sharp and abrasive. The plant being situated near the sea coast the belt was also subjected to sea water.

In order to prevent the wear the belt was first well cleaned and then given a coating of tar on the working surface. This was allowed to dry until just tacky, then a coating of granite dust from the bins was sprinkled on. This dust was fine enough to go through a 100 mesh screen. When dry the belt had an abrasion resistant surface which was at the same time flexible. This coating was found to protect the belt satisfactorily.

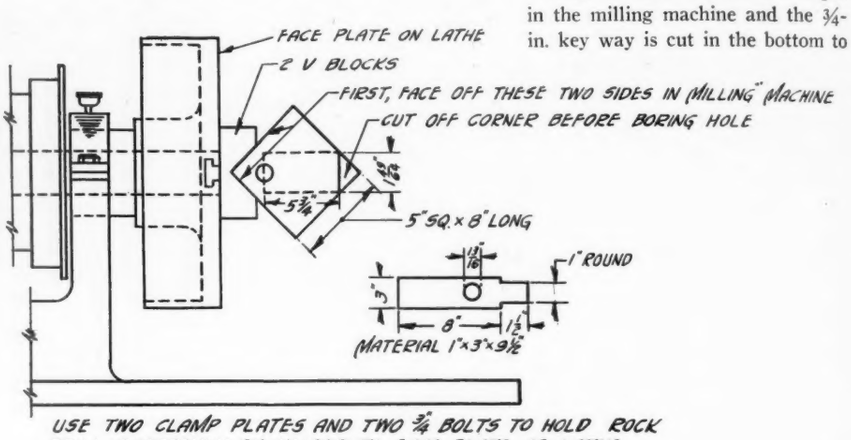
## Milling Rock Drills

By C. H. Wright
Snyder, N. Y.

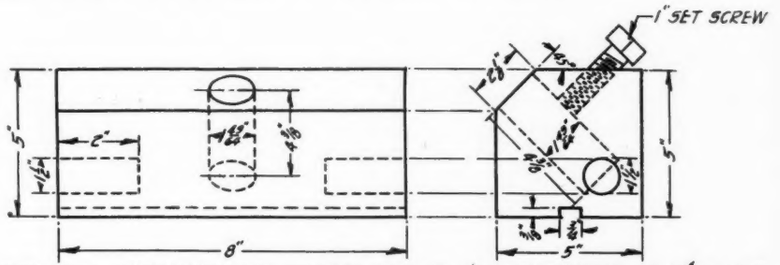
FREQUENTLY tools may be repaired to save considerable money if a little ingenuity is used. An illustration is with dies used in the Ingersoll-Rand drill sharpening machine. There are various dies for different size drills. If these dies were to be annealed and filed so they could be used again, it would be a rather large undertaking and quite expensive.

With a milling machine and a die holder, found in many quarry machine shops, all the dies can be annealed and resharpened without much time lost in setting up the machine, because one setting is all that is necessary for all dies.

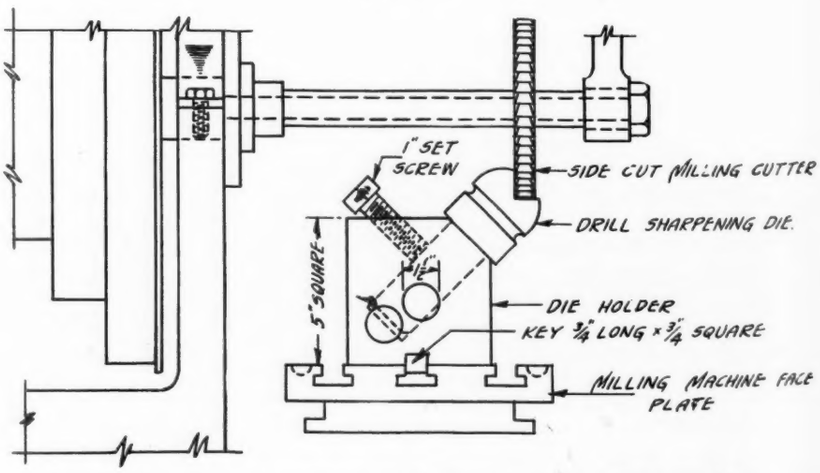
After it leaves the lathe it is put in the milling machine and the ¾-in. key way is cut in the bottom to




USE TWO CLAMP PLATES AND TWO ¾" BOLTS TO HOLD ROCK DRILL SHARPENING DIE HOLDER TO FACE PLATE OF LATHE.




ROCK DRILL SHARPENING DIE HOLDER-CAN BE USED IN SHAPER OR MILLING MACHINE.




***Details of equipment necessary to sharpen drills in milling machine***

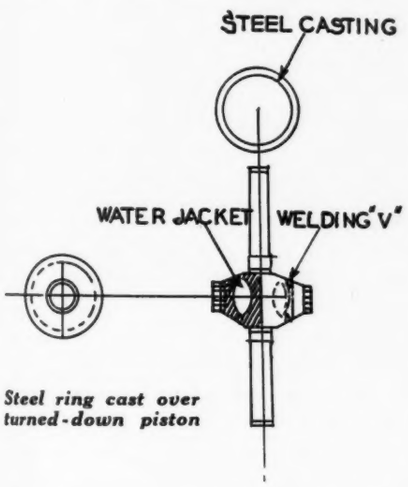
hold the die holder straight on the table or face plate of the milling machine, by using a ¾-in. square piece of steel that will neatly fit the slots in the milling machine face plate.

After the die holder is properly set in the milling machine, all that is necessary is a machinist's level to level one face on the die, and with the use of a side milling cutter, all of one face and part of another are machined in one operation.

## Repairing a Gas Engine Piston by Welding

By Orville Adams
Dallas, Tex.

A LARGE, double acting gas engine piston ran with stuck rings so often that the ring grooves and perimeter of the piston became so burnt down that further use was rendered impossible, due




*Steel ring cast over turned-down piston*

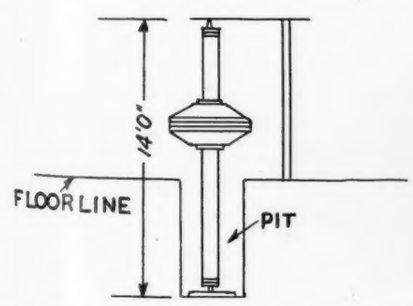
to the inability of the grooves to hold the rings.

Blow-by burned the ring grooves and in previous repair work over-width rings had been used. When the last set was put in, they were so wide, stiff, and deep that they did not radiate heat. Result, the piston had to be replaced or repaired, and it was suggested that the repair be undertaken as follows, which was done and the engines put back into service with the same success as new engines.

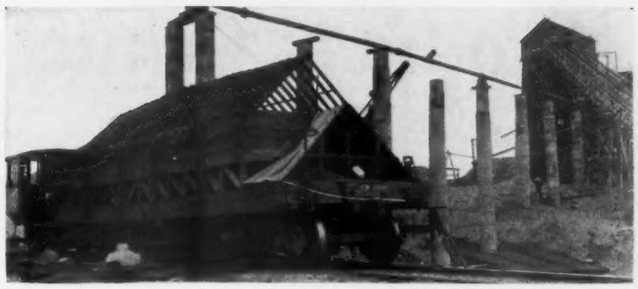
The periphery of the piston was machined down in a lathe until the metal down to the water jacket was removed. A steel ring was cast, since the original pistons were cast steel, and welded onto the remaining piston body. Welding V's were provided as shown and the work done with electric arc. Since the pistons were 29½ in. in diam. and the rods about 10 ft. long provision had to be made for handling the pistons during the welding operation, in order to obviate awkwardness in welding.

A floor pit was made and the piston rods set up vertically, so that the welders, standing in an erect position performed the weld with perfect ease and down welding was possible, facilitating better penetration and control of the arc, also enabling two welders to work as the piston was slowly revolved at a given rate. Several runs being required to fill the V, two welders could better perform the operation without experiencing the awkwardness of moving around and welding a circular groove or V with the depth of this one.

The repair cost less than one-tenth the cost of a new piston. Five such pistons were so repaired at one time. An arc welder of 300 amperes was used. It should be realized that replacing such pistons, which involved the rods, also would have proven expensive. The welding on of the ring resulted in a piston as good as new.




*Large piston easy to weld in pit*



*Hopper cars dump to skip hoist pit*

## Car Grizzlies

THE Concrete Materials Corp. has several large operations in the state of Iowa. One of its largest plants is at Humboldt. At this operation a Link-Belt electric dragline digs the material and loads to 30-ton standard gage hopper bottom dump cars of novel design.

The cars, as can be seen in the illustrations, have a bar grizzly built on top so that any large boulders encountered as not hauled to the plant but fall beside the track at the point of loading. Other operators have used the same device, and it has been described in these columns before. However it may still be novel to some operators.

It might be said that at this operation there are only a very few boulders or pieces of gravel that would be oversize, but by this method those few are kept from littering up the areas adjacent the track hopper serving the plant. The cars are pulled to the plant by a 12-ton Plymouth locomotive.

Two cars are pulled every other trip, the in between pull being with only one car.

## A Help to the Lubrication of Long Bearings

By Charles Labbe
Death Valley, Calif.

THE VERTICAL SHAFTS of a roller mill ordinarily have long bushings. The oil or grease is placed at the top and very often the lower part does not get sufficient lubrication.

In such case an improvement worth mentioning was done: By cutting into the shaft (being the easiest, although the same result would have been obtained if cut into the bushing) an oil groove of a pitch twice the diameter of the shaft and running in the counter direction of rotation as the shaft does, that is on a shaft running to the right (clockwise) the oil groove is cut left hand (counter clockwise), such groove to run two-thirds to three-fourths of the length of the bearing.

Some lubricant follows the groove when the machine is stopped and when running it has a tendency to bring up the oversupply. In fact it has improved the lubrication and there is no leakage.

*Dragline loads car through grizzly, leaving oversize at pit*

# Rock Products Clinic

## Masonry Cements—In This Case a Bouquet!

THE EDITOR: The lime industry should be eternally grateful to you for your very splendid and unadulterated editorial of July 18. It is most refreshing to see an impartiai observer committing himself to a statement that the lime industry itself has not had the courage to make before this.

I have been with this company for a little over two years, and going into it from the gypsum industry, it is easy to see what the main trouble is, and that is the lack of publicity based on the necessity for lime in construction. The whole trend of the sales organization is to hound the dealer to death for the little tonnage he buys today. We are going through the woods and we cannot find any kindling; and yet, though there may be a depression in the building industry, as far as I can analyze it there is enough work in the East to keep every plant busy, were we to get a fair share of the materials that go into the making of mortar, as well as the materials that go into the plastering of a building.

The gypsum industry has grown in the matter of thirty years from a tonnage of two hundred thousand to a tonnage close to four million, four-fifths of it going into the plastering business.

Lime for plastering has been eliminated completely throughout the United States, and yet it has all the advantages of a good sound product for this purpose.

I have been told by men in the industry that lime is a thing of the past for plastering. They admit defeat before they meet the enemy. To prove their contention is wrong I enclose a picture of a job now being plastered with lime. The first big job in the United States in a quarter of a century and one of the biggest jobs in the country being plastered today. It is a cheaper product from the standpoint of the yardage covered, yet we are getting three or four dollars a ton more than gypsum would sell for. It is hard and yet it is porous, therefore sound deadening.

I have tried to get our competitors to go into a promotional campaign pointing out the value and the necessity of lime for plastering purposes, but I might as well be talking to a wet jute bag.

To make it possible to merchandise a lime our company abandoned the shipping of barreled lime into the city of New York eighteen months ago. We deliberately gave up 85% of our tonnage into the metropolitan area and concentrated on a pulverized lime in paper bags. We were laughed at, because everybody knew that quicklime could not be contained in a paper bag more than a few weeks. It is true we had some trouble during the hot months last year but we perfected a new bag with the cooperation of the Valve Bag Co. and this bag though very good, was not 100%. It will interest you to know that we are now shipping pulverized quicklime in "Cellophane" bags, a thing that we have worked on for almost a year.

There is no substitute for lime in laying brick. And there is no substitute for sound merchandizing. This is where the lime industry is weak.

Were it not that I could see a trend on the part of architects and contractors towards the liberal use of lime as a result, I might say without boasting, of our company's promotional work with a skeleton sales organization, I would just as soon get a box of apples and a pair of smoked glasses and stand at the Grand Central Terminal and make a living with them.

The country is full of jobs that we can sell. The construction industry is looking around in a dazed manner to get the solution of their difficulties with leaky walls; the latest building being the Waldorf-Astoria hotel in New York, which is leaking like a basket, and the surprising thing is that the builders are now coming to us for relief, admitting that our statements made before this job started were sound.

DONAL O'CONNOR,
General Sales Manager,
Rockland & Rockport Lime Corp.

* * * * *

## Quarrying and Preparation of White Quartz

THE EDITOR: The quartz in our quarry lies in massive formation and is of a nearly pure white color. The vein is about 50 ft. below the surface and, as at present uncovered, shows a width of 30 ft. by 25 ft. deep.

Owing to the tight formation it is necessary to blast the rock out with dynamite. It is then hoisted to the yard and hand picked. The refuse is hoisted to the dump at the back of the quarry. The best grade is hauled to the mill for preparation.

*FIRST OPERATION*—The quartz is fed to a 12x18-in. jaw crusher which feeds to bucket elevator which takes it to the third floor of the mill, where it is fed to a revolving screen fitted with ⅛-in., ½-in., 1-in., 1½-in., and 2½-in. sections and each size dropped into its own bin.

*SECOND OPERATION*—When preparing "Bitstone," the ½-in. to 1-in. quartz is fed by gravity from the bins to a set of double rolls on the ground floor; the top rolls are corrugated and the bottom rolls are smooth. After crushing, all the product feeds to bucket elevator, which carries it to the top floor of the mill, where it feeds to a series of vibrating screens set to produce the particular size Bitstone or other quartz that we are preparing. After it passes through these screens it is carried by gravity to the first floor, where it is packed and weighed and is now ready for shipment.

The oversize returns by gravity to the rolls and goes back to the screens. The undersize goes to a separate bin where it is again screened and prepared for lithographing, filtering, abrasive and other purposes, which require the finer meshes.

The entire system is so arranged that once the material leaves the primary crusher the mill proper can be operated by three men.

ERNEST L. DINNING, President,
The Hartford Talc Co., Inc.
Baltimore, Md.

* * * * *

## Removing Tannic Acid from Sand

A SUBSCRIBER writes: "Perhaps you know of some method of removing tannic acid (organic matter) from sand. My sand passes United States Public Roads and local municipal tests, but our state highway department reports its laboratory finds too much organic matter, even after the sand has gone through a preliminary washing process. I pump sand and gravel from a mountain stream direct into railway gondola cars."

* * *

## Editor Shaw's Reply

I know of no other method than to wash the sand well. I recall one plant in which they had a great deal of trouble until they settled the sand in a box and ran it out as dry as possible in a chute where it could be spread out thinly. A number of jets played on it as it passed through the chute. Then it went into another box where it was dewatered, and it was all right when it was discharged from this box.

You say that you are pumping directly into cars. If you could arrange to pump into a settling tank first, one, say 18 ft. long and 8 ft. wide and 8 or 10 ft. deep, it would be better. Then you could run the settled sand into the car through such a rinsing chute as I have described above, allowing the rinse water to run over the top of the car. This is the simplest and cheapest arrangement I can think of. A better way would be to run the sand from the settling tank to a sand drag with fresh water. This would bring it out well rinsed and fairly dry as it went into the car.

In every case where I have heard of trouble from tannic acid or other form of organic matter the difficulty disappeared after the sand was given a wash and a rinse with fresh water. Whatever would be the cheapest and most convenient way to do this would have to depend on the conditions at the plant.

EDMUND SHAW.

# Editorial Comment

**With or Without State Help**

We have no doubt that all who read the article, "Can the State Compel Producers to Earn a Profit?" in ROCK PRODUCTS, September 26, found it an exceedingly interesting and thought-provoking recital of the trials and tribulations of a group of producers—a very typical group, we are sure. At their wits' ends to cure their troubles some look to the state for assistance, others see the only solution in the law of survival of the fittest. Can the state be of any more help to them than they can be to themselves? Must all producers always suffer losses because a few foolish or reckless ones set the price? Can the state provide a penalty for a man's going into business without the capacity to conduct it sanely, ethically, honestly, successfully? Can business itself be so organized that the fool, the plunger, the crook, and the ignorant reap their just rewards?

What the state can do nobody knows. In this country it is largely an unexplored field. Even in the case of natural monopolies like the railways, the public utilities, etc., the government or the state has not been particularly successful in regulating competition, at least in the opinion of many business men. In the case of small businesses, easy to get into, the task of state supervision looks complicated indeed. To attempt it will certainly add tremendously to the number of government employes, and the costs of government. It is said that about 1 in 7 of the working population of the United States now is on some government payroll (national, state or local). Where will it end with government supervision of all industry?

The most obvious cure, at least a partial one, is merely the common practice of decency and honesty on the part of both buyers and sellers. For example, in Milwaukee there is no common standard of measurement in selling aggregate. Apparently most of it is sold by the cubic yard. But a cubic yard of sand, or fine gravel, is a variable thing, depending first on the amount of water contained, and secondly on the honesty of the shipper. In many cities the laws now require the sale of sand, gravel and crushed stone *by the ton,* the same as other commodities are sold; and producers are compelled to submit their scales to the same inspection by the city sealer of weights and measures as other merchants. We see no excuse for the absence of such an ordinance in Milwaukee.

Another glaring defect in the local aggregate industry at Milwaukee is the absence of standard contract forms, and the lack of requirement of written contracts for material. In many localities producers have voluntarily agreed among themselves on such standard quotation and contract forms, and there is no question about their helpfulness in eliminating abuses which creep into the industry without them. We see no reason why the state of Wisconsin, or the city of Milwaukee, should not require such contracts for the protection of the owner of the building to be constructed, especially in the case of public works, if for no other good and sufficient reason. For suppose the tables were turned and producers who were making deliveries took advantage of a sudden price increase to refuse further deliveries, as they would be legally justified in doing in the absence of a written or binding oral contract?

Whether or not written contracts would help prevent, under present conditions, the pernicious practice of competitors soliciting the business after a producer has already begun deliveries, is perhaps questionable. But it seems to us it should help in any case through giving both buyer and seller greater respect for their business honor, or honesty. We see no reason why contracts so made should not be published for the information of all producers and purchasers, and to avoid the excuse apparently commonly given by offending producers that they did not know of the existence of the contract. Doing business openly is always a strong deterrent to doing business crookedly. The folly of taking business away from competitors in this way at cut prices is so obvious that we cannot understand why the practice is persisted in, no matter how scarce business becomes.

Lack of adequate cost-keeping and ignorance of real costs on the part of many producers was clearly demonstrated at the hearing. This condition can be cured voluntarily by men of sufficient business capacity and integrity by adoption of a uniform cost-keeping system, and free and open discussion of costs which would prevent a well-meaning producer from fooling himself. But since we can not limit the industry to producers of sufficient capacity to do this of their own volition, we see no reason why a state like Wisconsin, which has a corporation profits tax, should not compel the installation of an adequate cost-keeping system by all producers, if for no other reason than to see that the profits tax is equitably applied, and that foolish or ignorant citizens do not deprive either themselves or the state of the just due of each. The United States government might do the same in connection with the application of the federal income tax.

The matter of unregulated truck competition is discussed elsewhere in this issue, in connection with the report of that part of the hearing which dealt especially with this phase of the problem. Trucks in this case frequently operated as common carriers, using the public highways, not only freely but recklessly, without any attempt to control tariffs; under conditions of competition which drove truck operators to take business at less than cost, without proper provision for insurance against accidents, the liability of which was greatly increased because of these conditions. We see no reason why truck operators should not be licensed or enfranchised as common carriers and compelled to establish a common tariff and to provide bond or other security against possible damage to highways and other property and possible loss of life and limb.

# Financial News and Comment

## RECENT QUOTATIONS ON SECURITIES IN ROCK PRODUCTS CORPORATIONS

| Stock | Date | Bid | Asked | Dividend |
|---|---|---|---|---|
| Allentown P. C. 1st 6's[27] | 10- 7-31 | 80 | 90 | |
| Alpha P. C. new com.[2] | 10- 5-31 | 10 | 11 | 25c qu. Oct. 24 |
| Alpha P. C. pfd.[2] | 10- 5-31 | 95 | 110 | 1.75 qu. Sept. 15 |
| Amalgamated Phosphate Co. 6's, 1936[19] | 10- 3-31 | 92 | 98 | |
| American Aggregates com.[39] | 10- 3-31 | 3 | 6 | 75c qu. Mar. 1 |
| American Aggregates pfd.[19] | 10- 3-31 | 50 | 60 | 1.75 qu. Oct. 1 |
| Amer. Aggr. 6's, w.w. | 10- 5-31 | 60⅛ actual sale | | |
| Amer. Aggr. 6's, ex-w.[19] | 10- 3-31 | 58 | 62 | |
| Am. L. & S. 1st 7's[27] | 10- 7-31 | 93 | 96 | |
| American Silica Corp. 6½'s[39] | 10- 6-31 | No market | | |
| Arundel Corp. new com. | 10- 2-31 | 26 | ..... | 75c qu. Oct. 1 |
| Bessemer L. & C. Cl. A[4] | 10- 4-31 | ..... | 15 | 50c qu. Aug. 1 |
| Bessemer L. & C. 1st 6½'s[4] | 10- 4-31 | ..... | 60 | |
| Bloomington Limestone 6's[27] | 10- 7-31 | 23 | 28 | |
| Boston S. & G. new com.[37] | 10- 3-31 | 6 | 8 | 15c qu. July 1 |
| Boston S. & G. new 7% pfd.[37] | 10- 3-31 | 32 | 36 | 87½c qu. July 1 |
| California Art Tile A | 10- 3-31 | ..... | 5¼ | 43¾c Mar. 31 |
| California Art Tile B[40] | 10- 1-31 | ..... | 2 | 20c qu. Mar. 31 |
| Calaveras Cement com. | 10- 3-31 | ..... | 4 | |
| Calaveras Cement 7% pfd. | 10- 3-31 | ..... | 75 | 1.75 qu. Oct. 15 |
| Canada Cement com.[42] | 10- 2-31 | 5¼ | 5¾ | |
| Canada Cement pfd.[42] | 10- 2-31 | ..... | 66 | 1.62½ qu. Sept. 30 |
| Canada Cement 5½'s[42] | 10- 2-31 | 87 | 92 | |
| Canada Cr. St. Corp. bonds[42] | 10- 2-31 | ..... | 90 | |
| Canada Crushed Stone com.[42] | 9- 4-31 | 3 | 6 | |
| Canada Crushed Stone pfd.[41] | 9-29-31 | ..... | 75 | |
| Certainteed Prod. com. | 10- 6-31 | 3 | 3½ | |
| Certainteed Prod. pfd. | 10- 6-31 | 22 | 27 | 1.75 qu. Jan. 1 |
| Cleveland Quarries | 10- 6-31 | ..... | 55 | 75c qu. Sept. 1 |
| Columbia S. & G. pfd. | 10- 5-31 | 88 | 91 | |
| Consol. Cement 1st 6½'s, A[44] | 10- 6-31 | 10 | 20 | |
| Consol. Cement Notes, 1941[27] | 10- 7-31 | No market | | |
| Consol. Cement pfd.[27] | 10- 7-31 | ..... | 70 | |
| Consol. Oka S. & G. 6½'s[12] (Canada) | 10- 2-31 | 98 | 100 | |
| Consol. Oka S. & G. pfd.[41] (Canada) | 9-29-31 | ..... | 75 | 1.75 qu. Oct. 10 |
| Consol. Rock Prod. com.[5] | 10- 1-31 | 30c | 1 | |
| Consol. Rock Prod. pfd.[5] | 10- 1-31 | 4 | 5 | 43¾c qu.June1,'30 |
| Consol. Rock Prod. units | 10- 5-31 | 4 | 6 | |
| Consol. S. & G. pfd. (Can.) | 9-22-31 | ..... | 50 | 1.75 qu. Aug. 15 |
| Construction Mat. com. | 10- 6-31 | 1⅛ | 3 | |
| Construction Mat. pfd. | 10- 6-31 | 10½ | 13 | 87½c qu. Aug. 1 |
| Consumers Rock & Gravel, 1st Mtg. 6's, 1948[35] | 10- 1-31 | 58½ | 62½ | |
| Coosa P. C. 1st 6's[27] | 10- 7-31 | 30 | ..... | |
| Coplay Cem. Mfg. 1st 6's[33] | 10- 2-31 | 60 | 70 | |
| Coplay Cem. Mfg. com.[33] | 10- 2-31 | 5 | 7½ | |
| Coplay Cem. Mfg. pfd[33] | 10- 2-31 | 25 | 40 | |
| Dolese & Shepard | 10- 6-31 | 24 | 26 | $1 qu. Oct. 1 |
| Dufferin Pav. & Cr. Stone pfd. | 9-22-31 | ..... | 65 | 1.75 qu. Oct. 1 |
| Dufferin Pav. & Cr. Stone com. | 9-22-31 | 6 | ..... | |
| Edison P. C. com.[32] | 10- 3-31 | 1½ | ..... | |
| Edison P. C. pfd.[32] | 10- 3-31 | 5 | ..... | |
| Federal P. C. 6½'s,1941[19] | 10- 3-31 | 90 | 100 | |
| Giant P. C. com.[2] | 10- 5-31 | 2 | 4 | |
| Giant P. C. pfd.[2] | 10- 5-31 | 10 | 15 | 1.75 s.-a. Dec. 15 |
| Gyp. Lime & Alabastine, Ltd. | 10- 6-31 | 5 | ..... | 10c qu. Oct. 5 |
| Gyp. Lime & Alabastine 5½'s | 9-28-31 | 75 | 82 | |
| Hermitage Cement com.[11] | 10- 3-31 | 15 | 25 | |
| Hermitage Cement pfd.[11] | 10- 3-31 | 65 | 70 | |
| Ideal Cement, new com.[29] | 10- 3-31 | 24 | 26 | 50c qu. & 50c ex. Oct. 1 |
| Ideal Cement 5's, 1943[29] | 10- 3-31 | 98 | 100 | |
| Illinois Electric Limestone 1st 7's[38] | 9-18-31 | ..... | 90 | |
| Indiana Limestone units[27] | 10- 7-31 | No market | | |
| Indiana Limestone 6's | 10- 6-31 | 14 actual sale | | |
| International Cem. com. | 10- 6-31 | 19 | 20 | $1 qu. Sept. 30 |
| International Cem. bonds 5's | 10- 6-31 | 60 | 61 | Semi-ann. int. |
| Iron City Sand & Gravel 6's, 1940[36] | 10- 1-31 | ..... | 70 | |
| Kelley Is. L. & T. new stock | 10- 6-31 | 17½ | 20 | 50c qu. Oct. 1 |
| Ky. Cons. St. V. T. C.[38] | 9-18-31 | No market | | |
| Ky. Cons. Stone 6½'s[38] | 9-18-31 | 70 | 80 | |
| Ky. Cons. Stone com. | 10- 6-31 | ..... | 4 | |
| Ky. Cons. Stone pfd. | 10- 6-31 | ..... | 77½ | 1.75 qu. May 1 |
| Ky. Rock Asphalt com. | 10- 6-31 | 3½ | 4¼ | 40c qu. Oct. 1, '30 |
| Ky. Rock Asphalt pfd. | 10- 6-31 | ..... | 60 | 1.75 qu. Sept. 1 |
| Ky. Rock Asphalt war.[45] | 10- 6-31 | 2 | 4 | |
| Ky. Rock Asphalt 6½'s | 10- 6-31 | 84½ | 88 | |
| Lawrence P. C. | 10- 3-31 | 20 | 26 | $1 qu. June 30 |
| Lawrence P. C. 5½'s, 1942[2] | 10- 5-31 | 60 | 75 | |
| Lehigh P. C. | 10- 6-31 | 7½ | 8½ | 25c qu. May 1 |
| Lehigh P. C. pfd. | 10- 6-31 | 83¼ | 88 | 1.75 qu. Oct. 1 |
| Louisville Cement[7] | 10- 2-31 | 125 | 150 | |
| Lyman-Richey 1st 6's, 1932[13] | 10- 2-31 | 92 | ..... | |
| Lyman-Richey 1st 6's, 1935[13] | 10- 2-31 | 90 | ..... | |
| Marblehead Lime 6's[14] | 10- 2-31 | No market | | |
| Marbelite Corp. com.[35] (cement products) | 10- 1-31 | ..... | 1 | |
| Marbelite Corp. pfd.[35] | 10- 1-31 | 1 | ..... | 50c qu. Oct. 10, '30 |
| Material Service Corp. | 10- 6-31 | 14½ | 15 | 50c qu. June 1 |
| McCrady-Rodgers 7% pfd.[22] | 10- 1-31 | 40 | ..... | 87½c qu. Sept. 30 |
| McCrady-Rodgers com.[22] | 10- 1-31 | 12 | 20 | 75c qu. Jan. 26 |
| Medusa Portland Cement | 10- 6-31 | ..... | 30 | 75c qu. Apr. 1 |
| Michigan L. & C. com.[6] | 10- 3-31 | 45 | ..... | |
| Missouri P. C. | 10- 6-31 | 16 | 18 | 50c qu. July 31 |
| Monolith Portland Midwest pfd. | 10- 2-31 | 1 | 1¼ | |
| Monolith Portland Midwest com.[9] | 10- 2-31 | 75c | 1 | |
| Monolith P. C. com.[9] | 10- 2-31 | 1½ | 2 | 40c s.-a. Jan. 1 |
| Monolith P. C. pfd.[9] | 10- 2-31 | 3½ | 4 | 40c s.-a. Jan. 1 |
| Monolith P. C. units[9] | 10- 2-31 | 8½ | 10 | |
| Monolith P. C. 1st Mtg. 6's[9] | 9-17-31 | 73 | 77 | |
| National Cem. (Can.) 1st 7's[27] | 10- 7-31 | 78 | ..... | |
| National Gypsum A com.[27] | 10- 7-31 | ..... | 3 | |
| National Gypsum pfd.[27] | 10- 7-31 | 40 | 43 | 1.75 Oct. 1 |
| Nazareth Cement com.[35] | 9-19-31 | ..... | 10 | |
| Nazareth Cement pfd.[35] | 9-19-31 | ..... | 85 | |
| Newaygo P. C. 1st 6½'s[27] | 10- 7-31 | 74 | 78 | |
| New England Lime 6's, 1935[19] | 10- 3-31 | 40 | 60 | |
| N. Y. Trap Rock 1st 6's | 10- 6-31 | 83 | ..... | |
| N. Y. Trap Rock 7% pfd.[30] | 9-22-31 | 95 | ..... | 1.75 qu. July 1 |
| North Amer. Cem. 1st 6½'s | 10- 6-31 | 30 actual sale | | |
| North Amer. Cem. com.[27] | 10- 7-31 | 1½ | 2½ | |
| North Amer. Cem. 7% pfd.[27] | 10- 7-31 | 5 | 10 | |
| North Shore Mat. 1st 5's[15] | 10- 6-31 | 75 | ..... | |
| Northwestern States P. C.[31] | 10- 3-31 | 80 | 85 | $2 Apr. 1 |
| Ohio River S. & G. com. | 10- 6-31 | ..... | 8 | |
| Ohio River S. & G. 7% pfd. | 10- 6-31 | ..... | 98 | |
| Ohio River S. & G. 6's[16] | 10- 3-31 | ..... | 80 | |
| Oregon P. C. com.[9] | 10- 2-31 | 8 | 12 | |
| Oregon P. C. pfd.[9] | 10- 2-31 | 80 | 85 | |
| Pacific Coast Aggr. com.[49] | 10- 1-31 | ..... | 1 | |
| Pacific Coast Aggr. pfd. | 10- 5-31 | ..... | 1½ | |
| Pacific Coast Cement 6's[8] | 10- 1-31 | 76 | ..... | |
| Pacific P. C. com.[5] | 10- 1-31 | 6 | 8 | |
| Pacific P. C. pfd.[5] | 10- 1-31 | 54 | 60 | 1.62½ qu. July 3 |
| Pacific P. C. 6's[5] | 10- 1-31 | 90 | ..... | |
| Peerless Cement com.[21] | 10- 6-31 | 1 | 2 | |
| Peerless Cement pfd.[21] | 10- 6-31 | ..... | 35 | 1.75 qu. Apr. 1 |
| Penn.-Dixie Cement com. | 10- 6-31 | 1 | 1¾ | |
| Penn.-Dixie Cement pfd. | 10- 6-31 | 6 | 10 | |
| Penn.-Dixie Cement 6's | 10- 5-31 | 44 | 45 | |
| Penn. Glass Sand Corp. 6's | 9- 3-31 | 98 | 101 | |
| Penn. Glass Sand Corp. pfd. | 7- 8-31 | 90 | ..... | 1.75 qu. Oct. 1 |
| Petoskey P. C. | 10- 6-31 | 3½ | 5 | 15c qu. Apr. 1 |
| Port Stockton Cem. com.[9] | 10- 2-31 | No market | | |
| Riverside Cement com.[5] | 10- 1-31 | 3 | 7 | |
| Riverside Cement pfd.[5] | 10- 2-31 | 55 | 60 | 1.50 qu. Aug. 1 |
| Riverside Cement, A[5] | 9-17-31 | 5 | 10 | 15c qu. Feb. 1 |
| Riverside Cement, B[5] | 10- 2-31 | 1 | 2 | |
| Roquemore Gravel 6½'s[17] | 10- 2-31 | 98 | 100 | |
| Sandusky Cement 6½'s, 1931-37[19] | 10- 3-31 | 90 | 100 | |
| Santa Cruz P. C. com.[5] | 10- 1-31 | 78 | ..... | $1 qu. Oct. 1 |
| Schumacher Wallboard com. | 10- 3-31 | ..... | 6⅛ | 25c qu. June 27 |
| Schumacher Wallboard pfd. | 10- 3-31 | ..... | 20 | 50c qu. Nov. 15 |
| Southwestern P. C. units[35] | 10- 1-31 | 225 | 250 | |
| Standard Paving & Mat. (Canada) com. | 9-28-31 | 4 act. sale | | 50c qu. May 15 |
| Standard Paving & Mat. pfd. | 9-28-31 | 60 | ..... | 1.75 qu. Aug. 15 |
| Superior P. C., A | 10- 3-31 | 34 | 36 | 27½c mo. Nov. 1 |
| Superior P. C., B | 10- 3-31 | 7¼ | 10 | 25c qu. Mar. 20 |
| Trinity P. C. units[31] | 10- 3-31 | 90 | ..... | |
| Trinity P. C. com.[31] | 10- 3-31 | 15 | 25 | |
| Trinity P. C. pfd.[27] | 10- 7-31 | 85 | ..... | |
| U. S. Gypsum com. | 10- 6-31 | 25 | 25½ | 40c qu. Sept. 30 |
| U. S. Gypsum pfd. | 10- 6-31 | 115 | 120 | 1.75 qu. Sept. 30 |
| Wabash P. C.[21] | 10- 6-31 | ..... | 21 | |
| Warner Co. com.[16] | 10- 3-31 | 13 | 16 | 25c qu. Oct. 15 |
| Warner Co. 1st 7% pfd.[16] | 10- 3-31 | ..... | 90 | 1.75 qu. Oct. 1 |
| Warner Co. 1st 6's | 10- 6-31 | 60 actual sale | | |
| Whitehall Cem. Mfg. com.[30] | 9-22-31 | 75 | ..... | |
| Whitehall Cem. Mfg. pfd.[30] | 9-22-31 | 50 | ..... | |
| Wisconsin L. & C. 1st 6's[15] | 10- 6-31 | 80 | ..... | |
| Wolverine P. C. com. | 10- 6-31 | ..... | 4 | 15c qu. Nov. 15 |
| Yosemite P. C., A com.[35] | 10- 1-31 | 1 | 1¾ | |

Quotations by: [1]Watling Lerchen & Hayes Co., Detroit, Mich. [2]Bristol & Willett, New York. [3]Rogers, Tracy Co., Chicago. [4]Butler, Beadling & Co., Youngstown, Ohio. [5]Smith, Camp & Riley, San Francisco, Calif. [6]Frederick H. Hatch & Co., New York. [7]J. J. B. Hilliard & Son, Louisville, Ky. [8]Dillon, Read & Co., Chicago, Ill. [9]A. E. White Co., San Francisco, Calif. [10]Lee Higginson & Co., Boston and Chicago. [11]J. W. Jakes & Co., Nashville, Tenn. [12]James Richardson & Sons, Ltd., Winnipeg, Man. [13]Stern Bros. & Co., Kansas City, Mo. [14]First Wisconsin Co., Milwaukee, Wis. [15]Central-Republic Bank & Trust Co., Chicago. [16]J. S. Wilson, Jr., Baltimore, Md. [17]Citizens Southern Co., Savannah, Ga. [18]Dean, Witter & Co., Los Angeles, Calif. [19]Hewitt, Ladin & Co., New York. [20]Tucker, Hunter, Dulin & Co., San Francisco, Calif. [21]Baker, Simonds & Co., Inc., Detroit, Mich. [22]Peoples-Pittsburgh Trust Co., Pittsburgh, Penn. [23]A. B. Leach & Co., Inc., Chicago, Ill. [24]Richards & Co., Philadelphia, Penn. [25]Hincks Bros. & Co., Bridgeport, Conn. [26]Bank of Republic, Chicago, Ill. [27]National City Co., Chicago, Ill. [28]Chicago Trust Co., Chicago, Ill. [29]Boettcher & Co., Denver, Colo. [30]Hanson and Hanson, New York. [31]S. F. Holzinger & Co., Milwaukee, Wis. [32]Tobey and Kirk, New York. [33]Steiner, Rouse and Co., New York. [34]Jones, Heward & Co., Montreal, Que. [35]Tenney, Williams & Co., Los Angeles, Calif. [36]Stein Bros. & Boyce, Baltimore, Md. [37]Wise, Hobbs & Arnold, Boston. [38]E. W. Hays & Co., Louisville, Ky. [39]Blythe Witter & Co., Chicago, Ill. [40]Martin Judge Co., San Francisco, Calif. [41]A. J. Pattison Jr. & Co. Ltd., Toronto, Canada. [42]Nesbitt, Thomson & Co., Montreal. [44]E. H. Rollins, Chicago. [45]Dunlap, Wakefield & Co., Louisville, Ky. [46]Dan Powell & Co., Los Angeles.

## Bessemer Cement Statement

THE income account and balance sheet of the Bessemer Limestone and Cement Co., 1930 and 1929, are reported as follows:

INCOME ACCOUNT, YEARS ENDED DECEMBER 31

| | 1930 | 1929 |
|---|---|---|
| Net income | $267,766 | $393,683 |
| Class A dividends | 112,500 | 150,000 |
| Class B dividends | 50,000 | 100,000 |
| Balance | $105,266 | $143,683 |
| Earned per share, Class A | $5.35 | $7.87 |
| Earned per share, Class B | 1.18 | 2.44 |
| Distributed per share, Class A | 3.00 | 3.00 |

Number of Class A shares, 50,000.
Number of Class B shares, 100,000.

BALANCE SHEET AS OF DECEMBER 31

| Assets: | 1930 | 1929 |
|---|---|---|
| †Property and equipment | $4,304,868 | $4,286,784 |
| ‡Limestone property | 716,780 | 717,438 |
| Investments | 25,604 | 72,661 |
| Miscellaneous receivables | 48,126 | 76,146 |
| Current assets: | | |
| Cash and marketable securities | 40,423 | 90,280 |
| Notes and accounts receivable | 508,323 | 506,492 |
| Inventories | 711,347 | 717,229 |
| Deferred charges | 258,836 | 275,417 |
| Advance stripping | 385,663 | 345,718 |
| Total | $6,999,970 | $7,088,165 |
| Liabilities: | | |
| *Class A stock | $1,500,000 | $1,500,000 |
| *Class B stock | 2,000,000 | 2,000,000 |
| Bonded debt | 2,239,000 | 2,279,500 |
| Current liabilities: | | |
| Notes payable | 88,000 | 31,220 |
| Accounts payable and accrued | 154,943 | 276,533 |
| Dividends payable | ..... | 37,500 |
| Equity on limestone property | ..... | 10,000 |
| Surplus | 1,018,027 | 953,412 |
| Total | $6,999,970 | $7,088,165 |
| | 1930 | 1929 |
| Current assets | $1,260,093 | $1,314,001 |
| Current liabilities | 242,943 | 355,253 |
| Working capital | $1,017,150 | $958,748 |

*Represented by 50,000 Class A and 100,000 Class B no par shares. †Less depreciation: 1930 $952,741; 1929, $682,305. ‡Less depletion: 1930, $26,746; 1929, $26,188.

## Crystalite Products Corp. Earnings

THE Crystalite Products Corp., Los Angeles, Calif., for the fiscal year ended June 30, 1931, reports net earnings of $4155, after taxes and charges, including nonrecurring loss on investments, equal to $4.22 a share on 985 shares of 7% cumulative preferred stock. This compares with net profit of $10,132 for the fiscal year ended June 30, 1930, equivalent to $10.13 a share on 1000 shares of preferred stock.

The company omitted the regular quarterly payment of $1.75 a share on the preferred stock, due July 1.

As of June 30, 1931, current assets were $81,889, of which $57,491 represented inventories. Current liabilities totaled $3799.

Sales and net earnings, after charges, available for preferred dividends for the fiscal year, follow:

| | 1931 | 1930 | 1929 |
|---|---|---|---|
| Sales | $89,415 | $69,900 | $74,726 |
| Net after charges | 4,155 | 10,132 | 13,297 |
| Earned a share on preferred stock | 4.22 | 10.13 | 13.30 |

The balance sheet, as of June 30, 1931, follows:

*Assets*—Current, $81,889; investments, real estate not used in operations and stocks, $29,871; land, buildings and equipment, less depreciation, $84,976; deferred charges, $1618; intangible assets, patents, etc., $10,040; total assets, $208,394.

*Liabilities*—Current, $3799; preferred stock, $98,500; common stock, $109,139; surplus account, discount repurchases of capital stock, $615; less deficit, $3659; total liabilities, $208,394.

Paul D. Howse, president, in a letter to stockholders on earnings, said in part:

"Despite the general business depression, gross sales of your company for the year ended June 30, 1931, amounted to $89,415, representing an increase of $19,289, or 27.5% over sales of the preceding year. The final net for the year, after all charges and federal taxes, was $4155. During this period it was deemed advisable to dispose of certain investments in stock of other companies at a loss of $5398, thus preventing in the light of subsequent market declines a substantial further loss on these investments."

## Balance Sheet of Lee Lime Co.

THE BALANCE SHEET of the Lee Lime Co., Lee, Mass., as of April 30, 1931, is reported as follows:

ASSETS

| | |
|---|---|
| Real estate | $ 90,645 |
| Machinery | 94,439 |
| Tools and equipment | 315,576 |
| Merchandise | 19,911 |
| Cash | 6,341 |
| Accounts receivable | 44,962 |
| Securities | 4,329 |
| Notes receivable | 6,290 |
| Furniture, fixtures, supplies | 11,764 |
| Vehicles | 15,455 |
| Profit and loss | 129,701 |
| Total | $739,413 |

LIABILITIES

| | |
|---|---|
| Mortgages | $ 20,000 |
| Accounts payable | 21,445 |
| Notes payable | 90,061 |
| Reserved for depreciation | 218,388 |
| Surplus | 38,035 |
| 8000 shares no par value | 351,484 |
| Total | $739,413 |

## Recent Dividends Announced

| | | | |
|---|---|---|---|
| American Aggregates pfd. (qu.) | 1.75, | Oct. | 1 |
| Consolidated Oka Sand and Gravel pfd. (qu.) | 1.75, | Oct. | 10 |
| Gypsum, Lime and Alabastine (qu.) | 0.10, | Oct. | 5 |
| Liberty Limestone pfd. (qu.) | 1.75, | Oct. | 1 |
| Medusa Portland Cement pfd. (qu.) | 1.50, | Oct. | 1 |
| McCrady-Rodgers pfd. (qu.) | 0.87½, | Sept. | 30 |
| Newaygo Portland Cement pfd. (qu.) | 1.75, | Sept. | 30 |
| Southwestern Portland Cement com. (qu.) | 1.50, | Oct. | 1 |
| Southwestern Portland Cement pfd. (qu.) | 2.00, | Oct. | 1 |
| Superior Portland Cement Class A (mo.) | 0.27½, | Nov. | 1 |
| Wallace Sandstone Quarries pfd. | 1½%, | Oct. | 15 |

## Dividend Omitted

THE Lawrence Portland Cement Co., New York City, has omitted its usual quarterly dividend of $1 on common stock, due at this time.

## United States Gypsum Co. Third Quarter Earnings

OPERATIONS of the United States Gypsum Co. for the third quarter of this year resulted in a profit, it was stated by Sewell L. Avery, president, who said that, in spite of the demoralized conditions which have prevailed in the building industry this year, the company has shown earnings for every month thus far. The company does not publish quarterly earnings figures, hence no figures were given by Mr. Avery. The latest available report, that for the six months ended June 30, 1931, showed a net income of $2,241,560 after all charges, including depreciation, depletion and federal taxes, equal after preferred dividends to $1.62 a share on the common stock.

Mr. Avery pointed out that since June 30, 1931, the company has improved an already strong financial position. On that date United States Gypsum had current assets of $18,572,107 as against current liabilities of $1,622,736. United States government and municipal securities totaled $9,609,724. Aside from current obligations there was no indebtedness.—*Chicago* (Ill.) *Journal of Commerce.*

## Uvalde Rock Asphalt Co. Statement

THE Uvalde Rock Asphalt Co., San Antonio, Tex., reports for the year ending December 31, 1930, a net profit of $29,713, after all charges.

BALANCE SHEET OF THE UVALDE ROCK PRODUCTS CO. AS OF DECEMBER 31, 1930

ASSETS

| | 1930 | 1929 |
|---|---|---|
| *Property account | $ 600,717 | $ 668,482 |
| Rock in place | 29,356 | 78,695 |
| Rock asphalt lease | 16,500 | 13,500 |
| Preferred stock G. W. T. Ry. Co. | 150 | 100 |
| Current assets: | | |
| Cash | 33,389 | 131,649 |
| Special deposits, etc. | 7,864 | 7,466 |
| Accounts and bills receivable | 969,147 | 769,668 |
| Municipal bonds | 96,115 | 21,000 |
| Inventory | 223,100 | 206,384 |
| Prepaid charges | 36,289 | 152,262 |
| Total | $2,012,627 | $2,049,207 |

LIABILITIES

| | | |
|---|---|---|
| Capital stock | $ 600,000 | $ 600,000 |
| Funded debt | 255,000 | 285,000 |
| Current liabilities: | | |
| Accounts and bills payable | 33,279 | 4,253 |
| Paving certificate discount | 65,363 | ..... |
| Federal taxes | 7,107 | 13,523 |
| Accrued interest | 4,384 | 5,893 |
| Surplus | 1,047,495 | 1,140,538 |
| Total | $2,012,627 | $2,049,207 |
| Current assets | $1,329,615 | $1,136,167 |
| Current liabilities | 110,133 | 23,669 |
| Working capital | $1,219,482 | $1,112,498 |

*After depreciation: 1930, $517,428; 1929, $424,027.

## Dividend Reduced

THE Gypsum Lime and Alabastine Co. of Canada, Ltd., Paris, Ont., reduced the quarterly dividend to 10c., placing the common stock on a 40-c. annual basis, against 60c. previously.

# Traffic and Transportation

## Proposed Changes in Rates

THE following are the latest proposed changes in freight rates up to the week of October 3:

### NEW ENGLAND FREIGHT ASSOCIATION DOCKET

23483. **Stone, broken or crushed,** in bulk in gondola or other open-top cars (See Note 3), from York Hill Quarry, Meriden, Conn., to Roxbury, Conn. Present rate, 85c per net ton; proposed, 80c. Reason—To provide a rate to meet local ledge competition.

23485. **Common sand and screened or crushed gravel,** minimum weight 50 net tons, from Manchester, N. H., to Nashua, N. H. Present rates, sand 60c, gravel 70c per net ton; proposed, 50c. Reason—To enable the carrier to obtain the haul on material which would otherwise be trucked from a local pit.

### TRUNK LINE ASSOCIATION DOCKET

27651. **Crushed stone,** carloads (See Note 2), from Wilmington, Del., to Yorklyn, Del., 80c per net ton. Present rate 90c. Reason—Proposed rate is comparable with rate from Havre-de-Grace, Md., to Yorklyn, Del.

27660. **Stone, crushed, coated with oil, tar or asphaltum,** carloads (See Note 2), from Casparis, Penn., to stations on the B. & O. R. R., connections and beyond, in C. F. A. territory, rates ranging from 10 mi. and under 96c per net ton to scale of rates 400 mi., $3.03 per net ton, and to B. & O. R. R. and connecting lines in Trunk Line territory, rates to be on basis of Birdsboro single line scale plus 30c.

27673. (a) **Crushed stone,** carloads, (b) **crushed stone, coated with tar, oil or asphaltum** (amesite), carloads (See Note 2), from White Haven, Penn., to Frackville, Penn. (a) $1.10 and (b) $1.20 per net ton. (See Note 5.)

27682. **Sand, carloads** (See Note 2), from Granville, Horningford, Huntington, McVeytown, Mapleton, Mill Creek, Newton-Hamilton, Ryde, Tatesville and Vineyard, Penn., to Powhatan, Ohio, $1.95 per net ton. Reason: Proposed rate is comparable with rates to Woodland, Paden City, W. Va., etc.

27684. **Stone, natural** (other than bituminous asphalt rock), **crushed,** carloads (See Note 2), from Marlboro, N. Y. Rates per net ton:

| To points in N. Y. | Prop. | Pres. |
|---|---|---|
| Milton | 75 | 60 |
| Highland | 75 | 60 |
| West Park | 75 | 60 |
| Esopus | 75 | 60 |
| Ulster Park | 75 | 60 |
| Port Ewen | 83 | 60 |
| Kingston | 83 | 60 |
| Lake Katrine | 91 | 70 |
| Mount Marion | 91 | 70 |

Reason—Investigation develops fact that the purpose for which the present rates were established no longer exists, and it is proposed to increase the rates at this time to the basis of rates prior to May 27, 1931.

27703. **Sand, viz., blast, common, engine, glass, molding quartz, silex and silica,** carloads (See Note 2), **and ground flint,** carloads, minimum weight 40,000 lb., from Granville, Horningford, Huntingdon, McVeytown, Mapleton, Mill Creek, Newton-Hamilton, Ryde, Vineyard and *Tatesville, Penn., to Lisbon, O., 12c per 100 lb. Reason: Proposed rate is fairly comparable with rates on like commodities from and to points in the same general territory.

*Rate from this point to apply on sand only.

27723. **Ground flint,** carloads, minimum weight 50,000 lb., from Trenton, N. J., to Boston and Ruby, Mass., 20c per 100 lb. Present rate, 28½c; sixth class. Reason: Proposed rates compare favorably with rates to Pittsfield and Acushnet, Mass.

27724. **Crushed stone and screenings,** carloads (See Note 2), from Hynoman, Penn., to Manns Choice, Penn., 60c per net ton. Present rate $1.15 (See Note 5).

27709. **Sand and gravel,** carloads (See Note 2), from Hopatcong Junction and Kenvil, N. J., to Annandale N. J., 60c per net ton. (See Note 4.)

27710. **Rip rap stone,** carloads (See Note 2), from Stockton, N. J., to Asbury Park and Long Branch, N. J., $1.15 per net ton. Present rate, $1.27. Reason: Proposed rate compares favorably with rates from Stockton, N. J., to Manasquan, N. J., and from Raven Rock, N. J.

27711. **Crushed stone,** carloads (See Note 2), from Morrisville, Penn., to Sunbury, Penn., $1.85 per net ton. Present rate, $2.30. (See Note 5.)

27713. **Crushed stone and screenings,** carloads (See Note 2), from York, Penn., to Oxford, Penn., $1.05 and Magnolia, Md., $1.15 per net ton (See Note 5.)

27748. **Crushed stone,** carloads (See Note 2), from Northampton, Penn. (rates in dollars per net ton).

| To points in Penn. | Prop. | To points in Penn. | Prop. |
|---|---|---|---|
| Delaware Water Gap | $1.15 | Cresco | 1.35 |
| Stroudsburg | 1.20 | Mountain Home | 1.35 |
| East Stroudsburg | 1.20 | Mt. Pocono | 1.45 |
| Analomink | 1.20 | Tobyhanna | 1.45 |
| Henryville | 1.20 | Pocono Summit | 1.45 |
| | | Gouldsboro | 1.45 |

(See Note 5.)

27759. **Ground limestone,** carloads, minimum weight 50,000 lb., from Bellefonte and Pleasant Gap, Penn., to Moundsville, W. Va., 12½c per 100 lb. Present rate, 25½c, sixth class. Reason: Proposed rate is fairly comparable with rates from and to points in the same general territory.

27763. **Sand,** other than blast, engine, foundry, molding, glass, silica, quartz or silex, carloads (See Note 2), from Northeast and Baltimore, Md., to Mt. Wolf, Penn., $1.15 per net ton. (See Note 5.)

**Note 1—Minimum weight marked capacity of car.**

**Note 2—Minimum weight 90% of marked capacity of car.**

**Note 3—Minimum weight 90% of marked capacity of car, except that when car is loaded to visible capacity the actual weight will apply.**

**Note 4—Reason—To meet motor truck competition.**

**Note 5—Reason—Proposed rates are comparable with rates on like commodities for like distances, services and conditions.**

27770. **Crushed stone,** carloads (See Note 2), from Water Street, Penn., to P. R. R., H. & B. T. M. R. R. and E. B. T. R. R. points, Petersburg, Millerstown, Harrisburg, Bedford, Glen Campbell, Wilmore, Johnstown, Ind., Cherry Tree, Portage, Saltsburg, McConnellstown, Riddlesburg, Everett, Shirleysburg, Evanston, Penn., and various, rates ranging from 60c to $1.30 per net ton. (See Note 5.)

27772. **Molding sand,** carloads (See Note 2), from Albany district sand shipping stations, also Round Lake and Gansevoort, N. Y., to Three Rivers, P. Q., $3.02 per net ton. (Applicable during period of navigation only.) Reason: To meet water competition.

### CENTRAL FREIGHT ASSOCIATION DOCKET

29342. To establish on **stone, crushed** (in bulk), **limestone, agricultural** (not ground or pulverized), (in bulk in open-top cars), and **limestone, unburned, agricultural** (in bulk in open-top cars), in carloads, from West Columbus and Highway, O., to points in Ohio (rates in cents per net ton):

| To | Pres. | Prop. | To | Pres. | Prop. |
|---|---|---|---|---|---|
| Peoria | 70 | 60 | Dunkirk | 100 | 70 |
| St. Marys | 300 | 70 | Williamstown | 100 | 80 |
| Raymonds | 80 | 70 | Arlington | 110 | 80 |
| Lunda | 90 | 70 | Beagle | 110 | 80 |
| W. Mansfield | 90 | 70 | Findlay | 110 | 80 |
| Horton | 100 | 70 | Galatea | 300 | 80 |
| Ridgeway | 100 | 70 | Toledo | 340 | 90 |
| Mentzer | 100 | 70 | Rich Hill | 80 | 70 |
| Kenton | 100 | 70 | Martel | 300 | 80 |
| Blanchard | 100 | 70 | Moline | 340 | 90 |

Sup. 1 to W. D. A. 29283. Withdrawal notice. White Docket Advice No. 29283, Docket Bulletin No. 2034, dated September 1, 1931, covering proposal to establish rate of 70c per net ton on **sand and gravel,** carloads, from Arbuckle, W. Va., to London, W. Va., is hereby withdrawn from the docket.

29359. To establish on **dolomite** (raw or crude) or **fluxing stone,** carloads, in open-top cars only (See Note 3), from Narlo, O., to Chicago, Ill., rate of 179c per gross ton. Present rate, 22c (6th class).

29367. To establish on **stone, crushed, and crushed stone screenings** (in bulk in open-top cars only), carloads, from Ashtabula and Ashtabula Harbor, O., to Jamestown, Penn., rate of 70c per net ton. Present rate, 11½c (6th class).

Sup. to W. D. A. 29009. **Withdrawal** notice covering proposal to establish on **sand,** refuse foundry, carloads, from Muncie, Ind., to Indianapolis, Ind., rate of 95c per net ton, is hereby withdrawn from the docket.

29455. To establish on **core sand,** carloads (See Note 3), from Vassar, Mich.

To Milwaukee, Wis., via car ferry routes, 240c per net ton. Present, 22½c.

To Green Bay, Wis., via car ferry routes, 265c per net ton. Present, 25½c.

To Kenosha, Racine and Waukesha, Wis., 265c per net ton. Present, 25½c.

To Madison, Wis., 290c per net ton. Present, 35c.

Sup. 1 to W. D. A. 28847. **Withdrawal** notice covering proposal to establish rate of 60c per net ton on **stone crushed,** carloads, from Lehigh, Ill., to Forest City, Ind., is hereby withdrawn from the docket.

### SOUTHWESTERN FREIGHT BUREAU DOCKET

23518. **Granite, stone, etc.,** from points in Missouri to Moline, Ill. To establish a rate of 13½c per 100 lb. on granite, crushed, stone, crushed, stone rubble and spalls, straight or mixed carloads (See Note 3), provided the minimum weight shall not be less than 40,000 lb. to Moline, Ill., from the following points: Doe Run, Mo., Doe Run Junction, Mo., Iron Mountain, Mo., Kimmswick, Mo., Lopez, Mo., Middlebrook, Mo., Mineral Point, Mo., Pilot Knob, Mo., Tiff, Mo. The rate and minimum weight proposed to Moline is in effect to Chicago in Item 1540, S. W. L. Tariff 68-M. While Chicago is about 40 mi. farther than Moline both points ordinarily take same rates on traffic from or to Missouri and the southwest. There is a contemplated movement to Moline and the shipper has requested publication of the Chicago rate. The distance from Pilot Knob to Moline is 328 mi., and the proposed rate seems reasonable for that distance.

## Proposed Reports in I. C. C. Cases

**Industrial Sand Rates.** As reported in the September 26 issue of ROCK PRODUCTS, Examiner Burton Fuller has proposed that the commission require rates on industrial sand in official territory be made in accordance with three scales. Industrial sand is described as that primarily adapted and used for glass making and for molding, abrasive, fire and furnace, and filter purposes.

Mr. Fuller said the commission should dispose of the cases, mentioned in the body of the report only by number, by finding as follows:

The commission should find that the interstates rates assailed in No. 17817 (Sub-No. 1) and 22907 to the Chicago district are not unreasonable. The commission should further find that the other rates assailed in these proceedings on sand, other than ground or pulverized, are, and for the future will be, unreasonable to the extent that they exceed or may exceed the bases set forth in Appendix H in this report, which bases it should find to be reasonable, nonprejudicial and nondiscriminatory for the future. The commission should further find that the rates assailed on ground or pulverized sand, silica, clay, and flint are, and for the future will be, unreasonable to the extent they exceed or may exceed rates made on the column 16 basis prescribed in the

Eastern Class Rate Investigation 164 I. C. C. 314, 171 I. C. C. 481 subject to a carload minimum of 60,000 lb. Attention of defendants is directed to the fact that, in order to maintain the relationship prescribed in St. Louis Traffic Bureau vs. A. T. & S. F. Ry. Co., 96 I. C. C. 421, no higher rates than column 16 rates should be established as proportional rates from St. Louis, Mo., on tripoli originating at Seneca, Mo. In No. 15833 the commission should affirm its former findings except it should find the rates assailed from Ottawa and Utica, Ill., to Keokuk, Ia., are, and for the future will be, unduly prejudicial to Keokuk and unduly preferential of Burlington, Ia., and Quincy, Ill., to the extent that they are less favorable to Keokuk, as compared with Burlington and Quincy, than would result from the bases prescribed herein.

The commission should further find that the rates assailed in Nos. 21091, 20554, 20803, 22053, 23377 and 23560, and the rates assailed in No. 23226 to destinations in Illinois, Indiana, Michigan and Wisconsin were unreasonable since July 10, 1929, to the extent that they exceeded rates based on 120% of the single-line West Penn scale, as extended in Scale I in Appendix H of this report, plus 24c for joint-line hauls; that the rates assailed in No. 23226 to other destinations were unreasonable to the extent that they exceed rates based on 140% of the Buckland scale as extended in Scale II in Appendix H, plus 28c for joint-line hauls; that the rate assailed in No. 22338 was unreasonable to the extent that it exceeded 280c; that the rate assailed in No. 23575 was unreasonable to the extent that it exceeded 195c; that the rates assailed in Nos. 22476, 21849, 21553, 20733, 21133 and 21133 (Sub-No. 1), 20828, 22289, 21383, 21136 and 21396 were unreasonable to the extent that they exceeded 66⅔% of the contemporaneous first-class rates from the same origins to the same destinations; that the rates assailed in Nos. 17272, 17272 (Sub-No. 1), 17272 (Sub-No. 2), 17338, 17822, 16250, 17060, 22098, 21486, 23340 and 23897 were not unreasonable; that the applicable rate on the shipments covered by No. 23912 from September 24, 1927, to December 31, 1928, was 24.5c per 100 lb., and that the applicable rates assailed in that proceeding were not unreasonable. Complainants and interveners seeking reparation in the cases in which the rates are found unreasonable or inapplicable in the past should comply with Rule V of the Rules of Practice, supporting their statements by affidavits that the shipments not covered by the evidence at the hearings were received and the charges thereon paid and/or borne by them.

The scales or bases of rates on industrial, other than ground or pulverized, and arbitraries, in cents a net ton, and instructions for their use, shown in Appendix H, follow:

BASES OF RATES PRESCRIBED ON INDUSTRIAL SANDS

(Other than ground or pulverized sand)

| Distances | Scale I Cents | Scale II Cents | Scale III Cents |
|---|---|---|---|
| 10 miles and under | 60 | 60 | 80 |
| 10 to 15 miles | 60 | 60 | 90 |
| 15 to 20 miles | 60 | 70 | 90 |
| 20 to 25 miles | 70 | 70 | 100 |
| 25 to 40 miles | 70 | 80 | 100 |
| 40 to 60 miles | 80 | 90 | 110 |
| 60 to 80 miles | 90 | 100 | 120 |
| 80 to 100 miles | 100 | 110 | 130 |
| 100 to 125 miles | 110 | 120 | 140 |
| 125 to 150 miles | 120 | 130 | 150 |
| 150 to 175 miles | 130 | 140 | 160 |
| 175 to 200 miles | 140 | 150 | 170 |
| 200 to 225 miles | 150 | 160 | 180 |
| 225 to 230 miles | 160 | 160 | 190 |
| 230 to 250 miles | 160 | 170 | 190 |
| 250 to 260 miles | 170 | 170 | 200 |
| 260 to 275 miles | 170 | 180 | 200 |
| 275 to 290 miles | 180 | 180 | 210 |
| 290 to 300 miles | 180 | 190 | 210 |
| 300 to 320 miles | 190 | 190 | 220 |
| 320 to 325 miles | 190 | 200 | 220 |
| 325 to 350 miles | 200 | 200 | 230 |
| 350 to 375 miles | 210 | 210 | 240 |
| 375 to 400 miles | 220 | 220 | 250 |
| 400 to 425 miles | 230 | 230 | 260 |
| 425 to 430 miles | 240 | 240 | 260 |
| 430 to 450 miles | 240 | 240 | 270 |
| 450 to 460 miles | 250 | 250 | 270 |
| 460 to 475 miles | 250 | 250 | 280 |
| 475 to 490 miles | 260 | 260 | 280 |
| 490 to 500 miles | 260 | 260 | 290 |
| 500 to 520 miles | 270 | 270 | 290 |
| 520 to 525 miles | 270 | 270 | 300 |
| 525 to 550 miles | 280 | 280 | 300 |
| 550 to 575 miles | 290 | 290 | 310 |
| 575 to 580 miles | 300 | 300 | 310 |
| 580 to 600 miles | 300 | 300 | 320 |
| 600 to 610 miles | 310 | 310 | 320 |
| 610 to 625 miles | 310 | 310 | 330 |
| 625 to 640 miles | 320 | 320 | 330 |
| 640 to 650 miles | 320 | 320 | 340 |
| 650 to 670 miles | 330 | 330 | 340 |
| 670 to 675 miles | 330 | 330 | 350 |
| 675 to 700 miles | 340 | 340 | 350 |
| 700 to 740 miles | 360 | 360 | 360 |
| 740 to 780 miles | 370 | 370 | 370 |
| 780 to 820 miles | 380 | 380 | 380 |
| 820 to 860 miles | 390 | 390 | 390 |
| 860 to 900 miles | 400 | 400 | 400 |
| 900 to 940 miles | 410 | 410 | 410 |
| 940 to 980 miles | 420 | 420 | 420 |
| 980 to 1020 miles | 430 | 430 | 430 |
| 1020 to 1060 miles | 440 | 440 | 440 |
| 1060 to 1100 miles | 450 | 450 | 450 |
| 1100 to 1140 miles | 460 | 460 | 460 |
| 1140 to 1180 miles | 470 | 470 | 470 |
| 1180 to 1220 miles | 480 | 480 | 480 |
| 1220 to 1260 miles | 490 | 490 | 490 |
| 1260 to 1300 miles | 500 | 500 | 500 |
| 1300 to 1340 miles | 510 | 510 | 510 |
| 1340 to 1380 miles | 520 | 520 | 520 |
| 1380 to 1420 miles | 530 | 530 | 530 |
| 1420 to 1460 miles | 540 | 540 | 540 |
| 1460 to 1500 miles | 550 | 550 | 550 |

## Final Presentation in Rate Increase Made by Sand and Gravel Industry

THE SAND AND GRAVEL INDUSTRY of the United States fired its final blast at the petition of the railroads for a 15% freight rate increase September 25 when Fayette B. Dow, counsel for a large portion of the industry, appeared before the Interstate Commerce Commission and argued the points brought out by witnesses for the industry at the various hearings held in the increased rates case.

Mr. Dow appeared for the National Sand and Gravel Association, Mississippi Sand and Gravel Association, Northeastern Ohio Sand and Gravel Association, Illinois Sand and Gravel Association, Indiana Sand and Gravel Association, Michigan Sand and Gravel Association, Ohio Sand and Gravel Producers Association and the Texas Crushed Stone, Sand and Gravel Association.

The attorney stressed the suggestion of V. P. Ahearn, executive secretary of the National Sand and Gravel Association, that the railroads and sand and gravel producers get together and readjust rates on sand and gravel through conferences rather than an attempt to increase all rates without taking into consideration local conditions and other facts which have a bearing on each particular rate adjustment.

"That this suggestion is worth considering as an alternative to an obviously harmful general rate increase," Mr. Dow said, "is clearly shown by the fact that the maintenance of a large and increasing volume of rail tonnage is directly in the interests of all the established producers of sand and gravel.

"Diversion from the railroads is, for the most part, diversion from the business of these producers. Therefore the suggestion is made that they adopt practical rather than legal methods of rate making.

"A further observation should be made. The carriers say in this case they would like the freight rate increase now and they may make some readjustments later. That, these producers believe, would be a disastrous course of action. It would destroy a great deal of rail business before the readjustments were made and, in the end, the railroads would stand to lose rather than to gain by the disruption of their traffic."

Mr. Dow concluded by stating that if an increase were decided upon by the commission the sand and gravel producers would prefer a flat increase in cents per ton.

"This case has been tried with some haste," he said, "but when an industry expresses a preference between two methods of rate increases that preference should not be disregarded without careful deliberation and adequate reasons."

## Seek Revised Stone and Gravel Rates in North Carolina

THE Corporation Commission of North Carolina recently received a petition from railway carriers for a revision of freight rates on gravel, pulverized limestone and marble between points in North Carolina. The general effect of the revisions would be upward, although there are reductions proposed in some cases.

The proposed scale went into effect on an interstate basis in southern states on September 9 over the protest of out-of-state shippers.

Present rates for a 25-mile haul of the commodities in question are 75c a hundredweight for single hauls and 95c for joint line hauls. Under the new scale both hauls would carry a 90c rate.

Present rates for a 200-mile haul are $1.60 for single line and $1.80 for joint line. Under the proposed scale both would take a $1.90 rate.—*Raleigh* (N. C.) *News and Observer.*

## Hear Case on Rock Asphalt, Sand and Gravel in Texas

THE TEXAS railroad commission has taken time out from oil proration to hear some traffic cases that are pending, according to announcement from C. F. Petet, secretary of the commission.

The case was to have been heard September 11. It was to inquire into the reasonableness of existing rates on asphalt rock and asphalt-coated stone, sand and gravel.—*San Antonio* (Tex.) *Express.*

# Ed. Shaw's News Letter From Los Angeles

IT IS SAID TO BE HARD to raise money for new public construction anywhere today, but there is evidence to show that it can be raised if it is for something the people really want, and if they are shown its need. The people of Santa Monica recently voted a bond issue of $690,000 to build a new breakwater and yacht harbor and the favorable vote was about three times the unfavorable. Furthermore, a much higher percentage of the registered voters went to the polls than is usual at bond elections. This was because the publicity was of the right sort, a spread of solid facts concerning costs, estimated income and benefits to existing beaches and other improvements.

### *Voters Are Indifferent*

The city has about 15,000 registered voters and about 1500 of them can be counted on to vote no on any proposition to spend money. A student of such matters tells me that this is almost everywhere the case. To carry a bond issue or proposal for public improvements is therefore a matter of getting more than 10% of the indifferent voters to see why they should vote yes and getting them to go to the polls. With a really meritorious proposition this can be done by proper advertising, even in times of great depression, something that is worth considering by those who are wondering where new business is coming from.

This improvement is one of those that may well be undertaken at such times as these. It is not one that is forced on the city by increased population, it develops the city's principal resource and in time will produce considerable income, enough to justify it's building on that ground alone. And there must be many cities in the United States where the need for such improvement exists and only waits to be recognized.

The rock products industry will benefit because much of the work will be of concrete. Cribs are to be made of reinforced concrete and filled with stone and sunk in position. The main breakwater will be about half a mile long.

### *Rock Products Industry Not Dead*

The rock products industry here is by no means dead and there are even new plants building or soon to be built. A large concrete products plant which will specialize in "travertite," an artificial travertine, has just been built at Southgate, on the edge of Los Angeles, by P. Grassi and Co. A new crushed rock plant is to be built and drawings are being made for it, but, fortunately, since there are more than enough such plants here, it is not in this territory. It is to furnish aggregate for a munitions depot in Hawaii, for which Thomas Haverty of Los Angeles has the contract. H. D. Jumper, engineer of the Consolidated Rock Products Co., is making the plans.

A friend, commenting on one of these letters which was published in the issue of September 12, says that the statement that only about 10% of the money raised by taxation is spent in new construction may be misleading. It is true that the greater part of the money that pays for paving, sewers and the like is raised by assessments against the property that is directly improved (not a general tax) and this method is not followed in many other cities. On one small property with which I am well acquainted the payments on assessment bonds and interest have been practically equal to the taxes on the place for the past three years. But there is the difference that the ordinary property holder has very little to say about the amount of his taxes, while he can do a great deal toward defeating a proposal to assess his property for street improvements and sewers. Anyone having property in an undeveloped section is generally glad enough to pay for having sidewalks and sewers put in, and if he has not the cash he can let the assessment go to bond and pay it off in five or ten years. It is the only way to make these improvements in a fast growing city, for the city as a whole has all it can do to build the bridges, tunnels, public buildings and other things that are for the benefit of the city as a whole.

### *Assessments Opposed*

But like other good things, this method has two sides. The other side is one that particularly affects the rock products industry now. Property owners are panicky and oppose assessments for all improvements, even those that are badly needed. The bonding system has its faults, too. I know of one property owner whose property was assessed and the improvement was made without him knowing anything about it. The first notice he had was when he learned that the bond against the property had been sold and it cost him a good bit to get back his title.

Recently I attended a hearing on an improvement and talked with some of the small home owners who were affected. It was pitiful to hear of the sacrifices they had made and the effort they had put into getting homes and now it looked as though they must lose them because with lessened incomes they could not carry the burden of taxes and assessments and interest any longer.

The fact is that even out here, where the climate and reasonable priced labor and materials render small home construction cheaper than in other parts of the country, it is next to impossible for the small salaried man and the mechanic to raise a family and pay for a home. Yet we must have home owners if we are to have a country with any stability. A man cannot be a very good citizen if he feels about his city as a man feels toward a boarding house in which he happens to be living.

For this reason I am glad that the federal government has begun to study small home ownership and intends to do something to make it easier. Too many men are living off the small home owner now. High interest, commissions, bonuses when a loan has to be refinanced and all that support and even make rich more persons than are necessary for such work. The whole system of buying and financing small properties needs to be improved.

Things are really looking better out here on the Coast. Signs of which I am certain are: that retail trade has increased 15%; cheap rents are in considerable demand and better class rents are in more demand than they were; a real estate man subdivided a piece of ground and, much to his surprise, he found a ready sale for the lots; no one has told me that "we are going to have a terrible winter" for at least a week, which is perhaps the best sign of all.

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## Reports Large Limestone Deposit in Washington

THE LARGEST SINGLE BODY of limestone west of the Rocky Mountains is claimed for the Soda Springs deposits by John D. Atkinson, who attended the recent mining congress at Wenatchee, Wash.

These deposits are located on the Little Wenatchee river about five miles west of the head of Lake Wenatchee and extend three miles to Soda Springs. The deposits cover about 1000 acres in blanket formation and are of the highest class marble limestone, running about 95% pure in carbonate of lime, it is claimed.

Tests have shown that with an abundance of high class alumina shales in the vicinity a portland cement that cannot be excelled in any respect on the Pacific Coast can be produced. Over 300,000,000 tons of the limestone is estimated in the deposit.

He points out an immediate field for cement in central Washington where the saving of freight charges will be a material factor. Puget Sound and other sections of the northwest also offer a market. Cement manufacturers of the east and capitalists of California are said to be making inquiries about the deposits.—*Wenatchee* (Wash.) *World.*

## Tariff Rates on Feldspar Argued

THE PRESENT TARIFF rates on feldspar were declared by the importers of that product to be "only a burden on the consumers" in this country, during a hearing before the United States Tariff Commission September 17.

The hearing was a part of the Commission's investigation of the tariff rates on feldspar brought about as a result of the application of the Consolidated Feldspar Corp., Trenton, N. J., for a 50% decrease in the present rates on the product. The present rates under the 1930 Tariff Act are: Crude feldspar, $1 per ton; ground feldspar, 30% ad valorem. Under the Tariff Acts of 1922 and 1913 crude feldspar was free and the duty on ground feldspar was the same in 1922 as at present, but under the 1913 Act it was 20%.

Those presenting argument for a decrease in the present duties were the domestic mills importing Canadian feldspar, while those opposing the decrease were the domestic producers and the American Mining Congress.

Victor B. Kelsey, of New York City, representing the Consolidated Feldspar Corp., said his firm not only mines the crude product in this country, but also imports the crude from Canada and mills it at Rochester, N. Y. He asserted that since 1923 imports of the Canadian product have been gradually decreasing, while production and consumption of domestic feldspar has increased. The Canadian product, he told the Commission, sells from $3 to $4 per ton higher than the American product, because of higher production costs and freight charges on the foreign product.

During the hearing it was brought out and agreed by both sides that the Canadian competition is the only competition domestic millers in the United States meet, although the product is produced by various European countries.

Henry N. Hanna of the Seaboard Feldspar Co. of Virginia, said his company does not find the Canadian product furnishing "serious competition." He added that he did not think that it would ever be a serious competitor to the domestic product in normal times, as the domestic feldspar sells from $7 to $8 per ton lower than the Canadian commodity.

Bruce Taylor, representing the Genesee Feldspar Co., Inc., Rochester, N. Y., grinder of the Canadian crude product only, concurred with the preceding witnesses, adding that the principal market for the finished product in the United States is the ceramics trade.

Explaining the value of an increased duty from the standpoint of labor, Henry Paine, consulting engineer of the American Mining Congress, stated that an increase in the present rate of duty of $1 per ton on crude feldspar would permit employment of 1100 additional workingmen at an annual total wage of approximately $140,000.

C. H. Peddrick, representing the United Feldspar Corp., submitted letters to the Commission which he stated were from the majority of feldspar grinders in the United States, representing an investment of over $4,000,000, none of which sanctioned a decrease and most of whom were in favor of an increase in the present rates. The domestic producers, he told the Commission, oppose any decrease in the present duty because they "see no reason for imports of the Canadian product."

Canada first placed a retaliatory duty of 15% ad valorem on imports of ground feldspar from the United States, and later raised the rate to 30% he said, because of the present duty on the crude product this country effected.

Mr. Peddrick predicted that "feldspar will be brought into the United States at ridiculously low prices in the future because large companies are being organized in Canada to extract radium from deposits which are largely composed of feldspar."

Labor cost in Canada per man is $2.50 per day, while in this country it is $3 per day, J. H. Weiss, a domestic producer, testified. He said the American workingman produces 4½ tons of the crude product per day compared with 0.9 ton produced daily by a Canadian worker.

Herbert P. Margerum, of the Consolidated Feldspar Corp., in answer to Mr. Peddrick, who said his company had evidently absorbed the increase in tariff over 1922 as they had not increased their prices during the first six months of this year, asserted that the Consolidated company had brought in a year's supply of the crude product in anticipation of the new tariff law.

## Consider Puget Sound Sites for Fertilizer Plant

EVERETT, Wash., industries may be augmented by the addition of a chemical manufacturing plant as the result of the inspection of probable industrial sites which two officials of companies interested in establishing a manufacturing plant in a Puget Sound city conducted there.

Mr. Miller of the Miller Products Co. of Portland and Mr. Bennett, a representative of the Chemical Mineral Co. of Alaska, were shown various industrial sites. They have conducted similar surveys in other sound cities, including Bellingham.

The Miller Products Co. is a $1,000,000 firm which is manufacturing fertilizers and sprays used in agriculture. The Chemical Mineral Co., on the other hand, has great deposits of nonmetallic minerals in Alaska which could be transformed into usable products by such a plant as the Miller company now has in Portland.

It is understood that if the company locates in a Puget Sound city, the Alaska deposits of sulphur and limestone will be brought from Alaska in the raw state and refined there.—*Everett* (Wash.) *News.*

## Announce Plans for Crushing Plant in California

A 25-YEAR LEASE of Watchumna Hill, near Lemon Cove, Calif., for manufacturing paving and building rock has been granted to J. H. Degman of the Permanite Paving Co. by the Kings county board of supervisors at Hanford.

Along with announcement that the board of supervisors had unanimously agreed to terms of a lease of the property owned outright the past 16 years by Kings county to him, Mr. Degman said that prospecting of the property would result in erecting a $100,000 plant on the site for rock crushing in from one to three months.

Machinery will include crushers, bunkers and a storage plant, besides a short rail spur from the Southern Pacific lines. The Southern Pacific officials have already contracted for early laying of the spur.

"Just as soon as this property is prospected," Mr. Degman said, "and if these prospects support our contention that Watchumna Hill contains the finest rock available in the San Joaquin valley, then there will be built the most modern crusher plant which money can buy."

Mr. Degman asserted that the primary purpose in acquiring the rock quarry site is to furnish rock at materially reduced prices to the Permanite Paving Co.

The new lease requires that Mr. Degman furnish Kings county, or any contractor laying pavement under private contract in Kings county, at 10% above cost of production. The original lease was to furnish the rock at such a saving only to Kings county, and not to contractors laying pavements under private contract for Kings county.

Mr. Degman estimated that the cost of rock would be reduced to about $1.25 a ton, where it is now selling at $2.25 a ton and up from other plants in the state. He said the price would especially be advantageous to that district bounded on the north by San Francisco and on the south by Bakersfield.—*Exeter* (Calif.) *Sun.*

## Canadian Asbestos Products Manufactured in 1930

MANUFACTURERS of asbestos products in Canada reached a new high level during 1930 when the output was valued at $2,301,924. This value was slightly in excess of the total for 1928 and marked the seventh successive year in which an advance has been made in this industry.

Capital employed by these concerns totaled $2,316,345, employes numbered 306 to whom $401,490 was paid in salaries and wages, and materials for manufacturing cost $1,327,025 at the works.

Products from these plants included asbestos brake linings, boiler and pipe covering, packings, shingles, lumber, paper, clutch facings, blackboards, tile, etc.

*Morning session of the Los Angeles safety meeting*

# California Regional Safety Meeting

By Edmund Shaw
Contributing Editor, Rock Products

THE fourth regional safety meeting of California portland cement manufacturers was held at the Biltmore, Los Angeles, September 25. It was under the auspices of the Portland Cement Association, but one of the leaders in the movement called the writer's attention to the difference between this and some former meetings. He said: "We used to be called to listen to someone from the association or some other organization but now we get together and do our own talking." Which is a good indication of the way safety work has progressed.

M. A. Koffman, secretary of the Southwestern Portland Cement Co., who had a lot to do with organizing this meeting, was its chairman, but he turned the chair over to H. E. Nichols, manager of the Southwestern plant at El Paso, Tex., for the morning session.

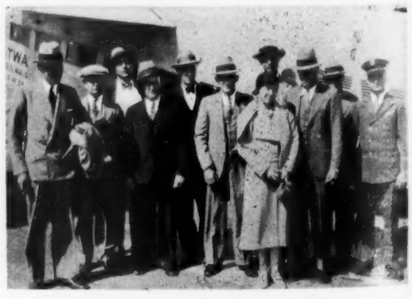
W. S. Trueblood, production manager of the Monolith Portland Cement Co., gave the first paper, which was a review of safety work throughout the country and its progress. Lost time accidents have dropped from 723 in 1929 to 524 in 1930 and fatalities from 37 to 20. This is not due to lower production, either, for later speakers showed that there is a greater hazard now in many departments because of changing men around and giving some of them unusual duties with a smaller force.

*The Santa Cruz team was brought down by airplane by Joseph Riordan, superintendent*

This was followed by a symposium on the most effective idea used during the past year to prevent accidents. O. H. Wheeler, for the Calaveras Cement Co., said that intensive personal instruction had been found most efficient and it had been proven that the foreman was the best instructor because he knew the men. And men have to be instructed in different ways because of differences in intelligence and mental capacity. It had been found advisable to place guards so that they served as reminders. W. J. Dermody, Cowell Portland Cement Co., showed a light chain ladder which can be easily carried. It is hung where a man has to poke down rock in the rock bin, making it easy to get out of the way of a slide. C. T. West, master mechanic at Monolith's California plant, said good housekeeping had been very effective. It came from an order to have everything off the floor that was not going to be used the same day, and this resulted in lessened accidents from stumbling. Clean walls and floors had been found helpful. H. Stephens, Pacific Portland Cement Co., said that training 98% of the men in first aid had been most effective. Since that was done in 1928 there had not been one lost-time accident. In a paper edited by the mill foreman and chemist, old accidents were studied and means for preventing repetitions worked out. Every machinist carries on his belt a lock to lock switches, and if more than one man works on a job all put locks on the switch to prevent one man going away and taking the only lock with him.

Mr. Jackson, Riverside Cement Co., had found the awarding of medals to foremen whose men had made good safety records very effective. Bars were awarded after the first year. S. L. Davis, Santa Cruz Portland Cement Co., thought it most important to have a doctor at hand at all times and to train every man in first aid. Education of new men was a most important feature. Ed. Williams, Southwestern Portland Cement Co., said the most important thing was to give men the right mental attitude toward accidents. A. P. De Jonckheere, Yosemite Portland Cement Corp., said the foreman was the key man. His job is to see that the company and the men get a square deal, and safety work is only one part, although an important part, of his work.

E. D. Barnett, superintendent of the Cowell plant, read a paper by W. H. George, secretary and general manager of the Cowell company, as Mr. George could not be present. Its title was "Executives' Relation to First Aid and Safety Work." The author thought that the attitude of an executive should be the same as that of every other man toward these things. He did not like the classification of men into executives and workmen, since all were working toward a common purpose. But executives have not only to see the need of safety methods and appliances; they have to convince the owners that the expense of installing them is



*The Calaveras delegation also arrived by plane*

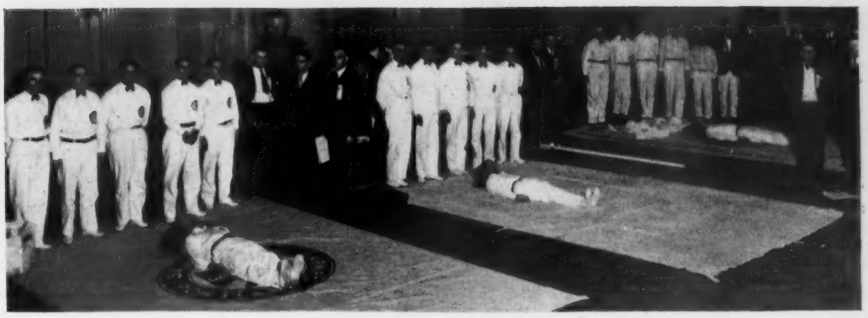
necessary. And the men have to understand that if the plant does not make cement profitably there will soon be no safety work because there will be no plant. Men find safety meetings a welcome break in the monotony of work and this is particularly true of new men.

A. S. Bilderdack, safety engineer of the Riverside company, spoke on eye hazards. For many purposes he thought the screen goggle better than that with lenses because some loss of clear vision is better than having the lenses fog. Lathe men and others who normally wear glasses are furnished with goggles that have lenses ground to fit their eyes. He exhibited a box of chips that had snapped from a shaft that was being turned, any one of which might have put out an eye. He advised especial care with goggles used in welding and said the foreman had goggles of different shades to use with different kinds of welding up to the heaviest electric welding. Goggles with head bands are better than those with ear hooks.

J. E. Jellick, advertising and promotion manager of the Calaveras Cement Co., had the chair for the afternoon session and opened with a witty talk that everyone enjoyed, even L. V. Robinson, superintendent of the Southwestern company, who was fined for "introducing advertising matter" in his luncheon speech. He got back at the chairman very neatly before the session was over and had him fined for the same offense.

An excellent paper on the hazards of glory-hole quarrying was read by R. O. Kinzie, chief engineer of the Santa Cruz company. This is considered one of the most dangerous methods of quarrying but at the company's Davenport quarry protection has been given the men in the way of safety manways and drifts, safety galleries and pockets at the chutes and bulldozing chamber and so on, so that there are no accidents now and there has not been a lost-time accident in two years. The men never have to stand where they are in danger when they are poking down rock in the chutes or drilling for blasting the large pieces.

A paper by Geo. Fisher, general manager of the Yosemite Portland Cement Co., was read by Mr. Johnson. It dealt with unusual causes of accidents and their prevention. One of these was ground squirrels. They have been known to push stones from the top of a 100-ft. quarry face, and even a small stone would kill a man dropped from that height. It would also set off caps and perhaps even powder. He advised getting rid of the squirrels and using boxes for explosives with shed roofs. Golf bags were good carriers for capped fuses, the exploders being protected by wool waste. He recommended putting the box of exploders on a shelf a few inches above the bench where fuses were capped so that the explosion of the one that was being crimped would not set off the whole box.



***The first-aid contest***

In a talk on first-aid training, S. H. Ash, district engineer of the U. S. Bureau of Mines, said that no type of accident was more preventable than mine explosions, and he thought that when the public understood this there would be no more explosions. The remainder of his talk was given to the technique of first-aid training.

There was to be a round table discussion on current safety problems at this point but it resolved itself into a discussion of the rule that a company must burn cement for at least six months to have its safety record approved. It was pointed out that in times like these many mills have all departments but the kiln room running for more than six months and thus there is a chance to lose their records while they cannot make new records. It was voted to draw up a resolution to send to the Portland Cement Association expressing the opinion of the meeting on this point.

J. W. Junad, safety engineer, California Portland Cement Co., drew a comparison between mechanical means, such as guards, and education of the men. Both means are effective but he thought a proper combination of the two would be more effective than either.

The remainder of the afternoon was given to the contest of first aid teams. Those competing were:

Cowell Portland Cement Co.—W. J. Dermody, captain; Victor Sayers, Robt. Olesen, A. Abasquez, I. Rodriguez, G. Ankunding. Walter Sullivan, judge.

Pacific Portland Cement Co.—J. L. Talkington, captain; B. Norton, T. Canvin, E. Coe, Thomas Ryder, W. Stephens. H. Stephens, judge.

Santa Cruz Portland Cement Co.—A. T. Brownfield, captain; Norman Jones, S. L. Davis, E. V. Whitesell, V. M. Streator, F. L. Talley. F. A. Rapp, judge.

One of the problems was considered exceedingly difficult, the patient being the victim of a boiler explosion with burns, fractures, a cut on one eye, unconscious and suffering from shock. To the ordinary observer there was nothing to choose between the work of the teams, as they all went at the work in a way that showed thorough training and completed it long before the gong rang. But the judges awarded the prize, on a scant margin of points, to the Pacific Portland Cement Co., and the Santa Cruz Portland Cement Co. was given second place. Each member of the winning team received an American Red Cross medal and a $10.00 gold piece and each member of the second team received a $5.00 gold piece.

M. A. Koffman was toastmaster at the banquet in the evening. W. A. Chowen, of the California Rating Bureau, paid a well-merited compliment to the industry, for its advanced safety work which had resulted in lowering its rates well below that of similar industries.

T. W. Osgood, of the California Industrial Accident Commission, made the principal speech of the evening, his subject being, "The Relation of Mental Attitude to Accident Prevention."

## Cooperative Research on Safety in Mines

THE cooperative mine safety research program was carried on successfully in the year 1930 in a manner similar to that described in the report for 1929, says U. S. Bureau of Mine's Investigations 3117.

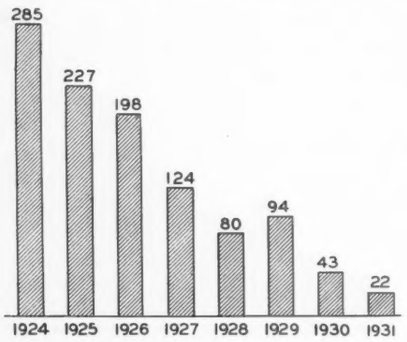
It is believed that the results of such fundamental work as is being done are unquestionably of great benefit in their application in the saving of life and health of miners. The research results compared and checked by investigations and by large-scale tests, as in the Experimental Mine, give confidence to mine operators, miners, and state mining officials in the findings of the various researches.

The annual report of the contact officers of the United States Bureau of Mines and the British Safety in Mines Research Board, who are cooperating in this work, to the director of the bureau and the chairman of the board, respectively, is given in full in this report. An appendix lists official publications issued on the cooperative work between the British Safety in Mines Research Board and the U. S. Bureau of Mines. It also lists those publications issued by the Safety in Mines Research Board.

## August Accidents

ACCIDENTS in the member mills of the Portland Cement Association remained at a low rate during August, totaling 21 mishaps involving loss of time and one fatality. Comparison with the record of August, 1930, is particularly favorable, there being 39 lost-time and 4 fatal accidents during that month.

The fatal accident of August, 1931, occurred to a coal handler regularly employed in the yard gang. The victim was told to stand clear of the track while the "shifter" engine came in to move coal cars. He acknowledged the order and then was evidently told to go to the other side of the car and attempt to remove some large lumps of coal. He failed to remain clear of the




***Comparison of August accidents***

car and as the shifter bumped it about 5 ft. he was knocked down, the wheels passing over both arms. Death resulted from shock.

Two of the lost-time accidents involved partial disabilities. An electrician, at work in a quarry, was helping to move a piece of heavy machinery which slipped, pinching the tips of the second and third fingers, necessitating amputation.

A laborer at work in the crushing department attempted to lift a section of 8-in. iron pipe but let it slip. His first finger was caught between the pipe and a rough slab of concrete, crushing the former so severely that amputation was necessary at the first joint; he lost approximately four weeks' time.

The collapse of a new concrete bin resulted in serious bruises and abrasions to four employes who were standing on top of it. In another instance, a quarry powder man and his helper engaged in touching off small charges of dynamite in a number of boulders. Before they had finished touching off the fuses the first charges lighted began to explode. A fragment of rock struck the helper on the heel causing severe lacerations and bruises.

The accident record for the month includes a number of near-injuries in which avoidance of serious harm must be attributed entirely to good fortune. In one of these cases an employe was applying dressing to a moving pulley belt when his sleeve was caught between belt and pulley, pulling him over. Fortunately the sleeve tore, releasing the victim, who received only slight injury to his arm or shoulder; had the sleeve held, fatal accident must surely have resulted.

Fifty-six plants completed the period from January 1 to September 1 without lost-time or fatal accident, as against 54 plants which made a clear record during the corresponding period last year.

## Three Universal Atlas Cement Plants Without Lost-Time Accidents

PLANTS of the Universal Atlas Cement Co. at Northampton, Penn., Leeds, Ala., and Independence, Kan., have gone through the first nine months of 1931 without a lost-time accident, Gordon C. Huth, safety director of the company, announced October 1.

Especially gratifying, according to Mr. Huth, is the record of the Northampton plant. This is one of the company's largest mills and also one of the largest mills in the entire country. In addition, the Hannibal Connecting railroad, which also is a Universal Atlas property, has gone without an accident since July, 1929.

Safety work at Northampton is in charge of M. W. Winsch, general superintendent; W. E. Gehres, safety supervisor, and the plant's safety committees. At the Leeds plant the safety work is in charge of B. E. Merrell, superintendent; D. M. Goss, safety supervisor, and the plant committees. At Independence, C. M. Carman, superintendent; Fred J. Davis, safety supervisor, and the safety committees handle the safety campaign.

In speaking of the record Mr. Huth said: "The gratifying records achieved by these three plants may be traced to a complete assumption of responsibility by operating officials and supervisory forces as well as personal responsibility on the part of every worker."

## Washer Installed in New Slag Plant in Alabama

A NEW SLAG operation is being established at Bessemer, Ala., by J. D. Roquemore, president of the Roquemore Gravel Co., Montgomery, who has been identified with the aggregate business of the south for more than 25 years.

The plant, now under construction, will commence production some time in October. It is equipped with Allis-Chalmers crusher, Cutler-Hammer magnetic separator and Nordberg screens. Material at the slag pile will be handled by a Bucyrus-Erie shovel and American Locomotive engine.

The slag will not only be crushed, screened and sized but also thoroughly washed. Construction work is being handled by the Awalt Construction Co., Montgomery. Initial production capacity will be 50 cars per day.—*The Dixie Manufacturer.*

## Explains Workmen's Compensation Rate Increase

FRANK H. SMITH, New Jersey commissioner of banking and insurance, and Leon S. Senior, general manager of the New York Workmen's Compensation Rating Board, following a decision handed down by George S. Van Schaick, superintendent of insurance for the state of New York, explain through Allen E. Beals in the current Dow Service Daily Building Reports, the reasons for the increase in compensation insurance rates effective in New Jersey next November, although they have been operative on new contracts in New York state since the first of September.

A similar increase is impending in almost every state in the Union, although the increase for the contracting industry in New York state, at least, is much less than it is for manufacturing and unclassified industrial groups. This is attributable, at least in part, to the safety campaign in the building construction industry, it is believed.

The general increase in rates resulting from this revision in New York amounts to 15% and is distributed over three broad industry groups. In this revision the manufacturing group was charged with an increase of 17% as compared with 5% on January 1, the contracting group with an increase of 9% as compared with 17% on January 1 and the "all other" group an increase of 13% as compared with 9% on January 1.

Commissioner Smith, in approving the increased rate for New Jersey, which, instead of differentiating between various groups, makes a flat increase of 12½% over the premium charges for this kind of industrial protection instead of the 15% average as approved by the New York state's insurance commissioner, said:

"There are those in the building business in New Jersey who are wondering why another increase in these rates must come in November when there was an increase in the spring of this year.

"Well, the explanation is that the severity of losses incurred under the workmen's compensation policies has made it apparent that the insurance companies have got to have larger premiums if they are going to be enabled to give the protection that the law requires them to.

"It has been said," added Mr. Senior, "that other industries besides insurance are suffering from the effect of the industrial depression. The answer to that is general business lines, which are not regulated by the state, find it possible to accumulate reserves during times of prosperity, whereas, in the case of companies rendering public service, such as insurance carriers, rate regulation coupled with intense competition makes it impossible to charge anything but minimum rates barely sufficient to cover current losses and expenses."

## Production of Stone in 1930

PRODUCTION OF STONE in the United States in 1930, exclusive of stone manufactured into lime, cement and abrasive materials, or crushed into sand, amounted to 126,996,340 short tons, valued at $178,948,611, according to a compilation of reports from producers made by the United States Bureau of Mines, Department of Commerce. The figures show a decrease of 10% in quantity and 12% in value from the 1929 production figures of 141,109,580 short tons, valued at $202,692,762.

All varieties of stone except that classed as "miscellaneous" and including chiefly crushed stone for concrete, road metal and railroad ballast decreased in both quantity and value of output. The total output of all important stone products except rubble, riprap and stone for miscellaneous uses decreased in quantity.

The building stone sold amounted to 30,169,270 cu. ft.—13% less than in 1929. This includes stone for architectural work and relatively low-priced stone for rough construction, such as foundations, bridges and unshaped face stone for buildings and retaining walls.

Paving blocks (31,586,626 blocks, valued at $2,669,511) decreased 1% in quantity. Stone sold for flagstones (1,095,780 cu. ft., valued at $705,775) decreased 3% in quantity. Stone sold for curbing (3,358,583 cu. ft., valued at $3,176,102) decreased 17% in both quantity and value. Total crushed stone amounted to 87,110,890 short tons, valued at $87,554,354 in 1930, a decrease of 6% in quantity and 7% in value. Crushed stone for concrete and road work (74,293,090 tons, valued at $77,347,379) decreased 2% in quantity and 4% in value, and crushed stone reported as used for railroad ballast (12,817,800 tons, valued at $10,206,975) decreased 23% in quantity and 26% in value.

Stone (limestone and marble) sold for fluxing to blast furnaces, open-hearth steel works, smelters and other metallurgical plants, amounted to 17,090,710 short tons, valued at $12,362,159, a decrease of 30% in quantity and 31% in value.

Stone reported for refractory use, which includes dolomite, quartzite and mica schist, amounted to 1,197,500 short tons, valued at $1,406,776, in 1930, a decrease in quantity of 23%. Raw dolomite reported as sold for the manufacture of refractories in 1930 amounted to 453,350 short tons, valued at $356,025. Besides this quantity, operators who both quarry and dead-burn or sinter dolomite reported 351,740 tons of sintered material, valued at $3,045,082. The quantity of raw dolomite reported was 12% less than in 1929, and the sintered material decreased 28%. Quartzite (ganister) used in the manufacture of refractory brick, for furnace lining and for the manufacture of ferrosilicon amounted to 718,370 short tons, valued at $952,462. This was a decrease of 28% in quantity.

Sales in 1930 of pulverized limestone for agricultural use amounted to 2,542,100 tons, valued at $3,309,329, a decrease of 4% in quantity from the sales for 1929.

The total quantity of stone for manufacturing industries and "other uses" showed a decrease in 1930 from 1929. This was due to decreased use of stone for some of the chief chemicals which use limestone in their manufacturing processes and also due to local conditions influencing the demand for stone for "other uses."

STONE SOLD OR USED BY PRODUCERS IN THE UNITED STATES, 1929 AND 1930, BY KINDS

| Kinds | 1929 Short tons (approximate) | 1929 Value | 1930 Short tons (approximate) | 1930 Value |
|---|---|---|---|---|
| Granite | 10,826,730 | $ 34,225,110 | 10,047,430 | $ 30,423,853 |
| Basalt | 14,871,780 | 18,946,197 | 14,532,250 | 17,053,031 |
| Marble | 553,660 | 16,545,312 | 477,240 | 12,905,596 |
| Limestone | 100,686,960 | 113,906,071 | 88,741,440 | 100,002,114 |
| Sandstone | 5,790,200 | 11,023,981 | 4,594,310 | 10,285,391 |
| Other stone | 8,380,250 | 8,046,091 | 8,603,670 | 8,278,626 |
| Total | 141,109,580 | $202,692,762 | 126,996,340 | $178,948,611 |

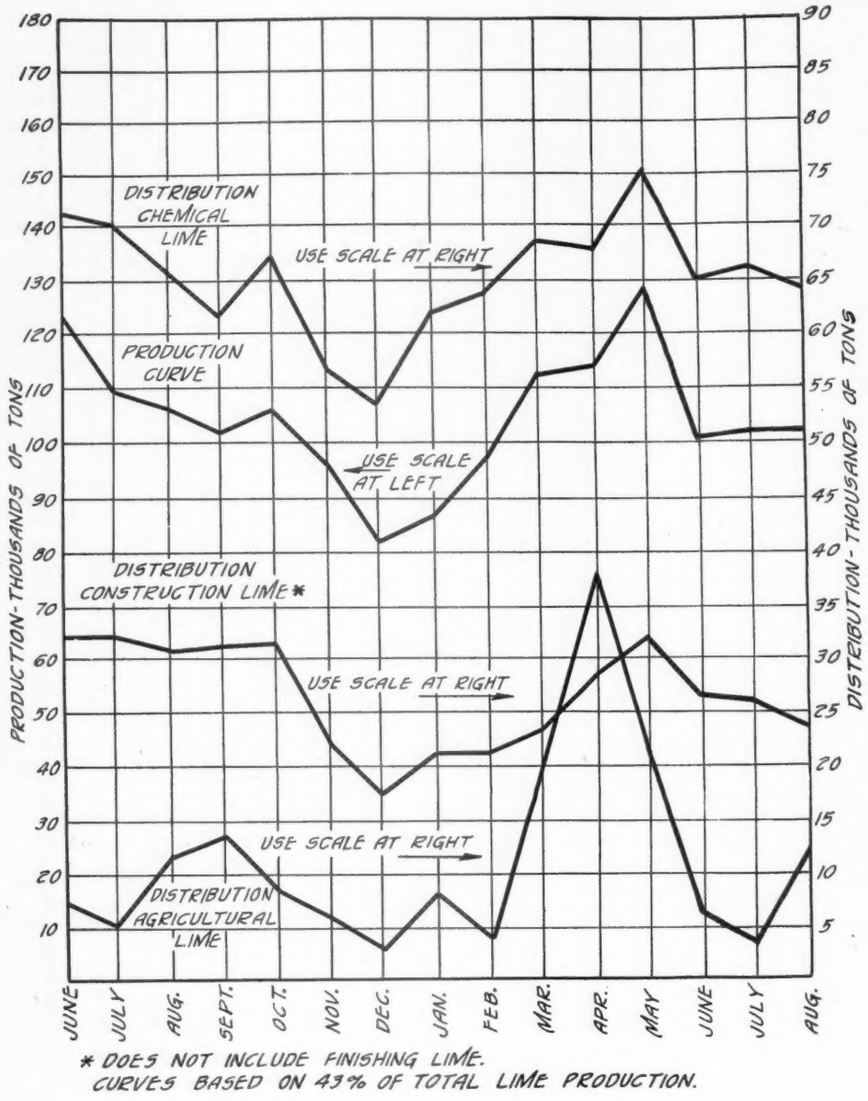
STONE SOLD OR USED BY PRODUCERS IN THE UNITED STATES, 1929 AND 1930, BY USES

| Use | 1929 Quantity | 1929 Value | 1930 Quantity | 1930 Value |
|---|---|---|---|---|
| Building stone | cu. ft. 34,761,140 | $ 43,905,123 | 30,169,270 | $ 39,111,527 |
| Short tons—approximate | 2,647,410 | ..... | 2,321,650 | ..... |
| Monumental stone | cu. ft. 4,410,140 | 15,848,126 | 3,517,870 | 13,157,550 |
| Short tons—approximate | 366,230 | ..... | 290,720 | ..... |
| Paving blocks | number 31,849,130 | 2,942,991 | 31,586,626 | 2,669,511 |
| Short tons—approximate | 300,360 | ..... | 294,560 | ..... |
| Curbing | cu. ft. 4,054,700 | 3,843,961 | 3,358,583 | 3,176,102 |
| Short tons—approximate | 336,360 | ..... | 262,170 | ..... |
| Flagging | cu. ft. 1,129,690 | 666,987 | 1,095,780 | 705,775 |
| Short tons—approximate | 87,750 | ..... | 81,680 | ..... |
| Rubble | short tons 907,810 | 1,324,681 | 1,066,590 | 921,937 |
| Riprap | short tons 4,212,990 | 5,030,743 | 4,292,030 | 4,739,122 |
| Crushed stone | short tons 92,721,260 | 94,387,878 | 87,110,890 | 87,554,354 |
| Furnace flux (limestone and marble) | short tons 24,393,500 | 18,034,910 | 17,090,710 | 12,362,159 |
| Refractory stone (ganister, mica schist and dolomite) | short tons 1,558,200 | 1,807,324 | 1,197,500 | 1,406,776 |
| Agricultural limestone | short tons 2,654,580 | 3,764,775 | 2,542,100 | 3,309,329 |
| Manufacturing indus. (limestone and marble) | short tons 7,430,749 | 6,361,201 | 6,021,200 | 5,324,274 |
| Other uses | short tons 3,492,381 | 4,774,062 | 4,424,540 | 4,510,195 |
| Total (quantities approximate in short tons) | 141,109,580 | $202,692,762 | 126,996,340 | $178,948,611 |

CRUSHED STONE SOLD OR USED BY PRODUCERS IN THE UNITED STATES IN 1930, BY STATES

| State | Concrete and road metal Short tons | Concrete and road metal Value | Railroad ballast Short tons | Railroad ballast Value | Total Short tons | Total Value |
|---|---|---|---|---|---|---|
| Alabama | 42,280 | $ 38,512 | 105,010 | $ 59,845 | 147,290 | $ 98,357 |
| Arizona | 344,440 | 353,365 | (*) | (*) | †344,440 | †353,365 |
| Arkansas | 702,180 | 867,239 | †109,560 | †78,728 | †811,740 | †945,967 |
| California | 6,831,590 | 6,197,526 | 746,080 | 479,613 | 7,577,670 | 6,677,139 |
| Colorado | 123,570 | 83,977 | (*) | (*) | †123,570 | †83,977 |
| Connecticut | †2,090,420 | †2,198,044 | 239,960 | 240,429 | †2,330,380 | †2,438,473 |
| Delaware | (*) | (*) | ..... | ..... | (*) | (*) |
| Florida | †1,538,520 | †1,020,270 | †252,310 | †240,591 | †1,790,830 | †1,260,861 |
| Georgia | 537,840 | 486,327 | (*) | (*) | †537,840 | †486,327 |
| Hawaii | 275,010 | 438,839 | 1,920 | 3,209 | 276,930 | 442,048 |
| Idaho | †318,460 | †310,517 | 90,000 | 67,453 | †408,460 | †377,970 |
| Illinois | 4,688,860 | 3,382,402 | 475,720 | 346,032 | 5,164,580 | 3,728,434 |
| Indiana | 2,715,640 | 2,438,387 | †249,760 | †167,882 | †2,965,400 | †2,606,269 |
| Iowa | 1,160,390 | 1,297,836 | 258,790 | 217,727 | 1,419,180 | 1,515,563 |
| Kansas | †669,860 | †640,309 | 428,560 | 374,093 | †1,098,420 | †1,014,402 |
| Kentucky | †1,773,720 | †1,828,442 | 634,340 | 465,689 | †2,408,060 | †2,294,131 |
| Louisiana | (*) | (*) | (*) | (*) | (*) | (*) |
| Maine | 40,310 | 81,171 | ..... | ..... | 40,310 | 81,171 |
| Maryland | †792,530 | †1,110,569 | 208,040 | 294,818 | †1,000,570 | †1,405,387 |
| Massachusetts | 2,347,450 | 3,000,944 | 390,930 | 396,219 | 2,738,380 | 3,397,163 |
| Michigan | 1,349,750 | 1,045,096 | †202,310 | †80,316 | †1,552,060 | †1,125,412 |
| Minnesota | 391,490 | 460,983 | (*) | (*) | †391,490 | †460,963 |
| Missouri | 2,230,800 | 2,758,617 | 40,390 | 44,719 | 2,271,190 | 2,803,336 |
| Montana | †16,430 | †18,277 | ..... | ..... | †16,430 | †18,277 |
| Nebraska | 36,810 | 37,523 | ..... | ..... | 36,810 | 37,523 |
| Nevada | (*) | (*) | ..... | ..... | (*) | (*) |
| New Hampshire | 59,720 | 98,759 | ..... | ..... | 59,720 | 98,759 |
| New Jersey | 2,481,100 | 3,425,718 | 81,410 | 100,143 | 2,562,510 | 3,525,861 |
| New Mexico | †45,000 | †45,000 | (*) | (*) | †211,000 | †158,440 |
| New York | 10,000,950 | 13,205,588 | 1,066,080 | 1,051,593 | 11,067,030 | 14,257,181 |
| North Carolina | †710,450 | †906,063 | 213,540 | 219,724 | †923,990 | †1,125,787 |
| Ohio | †8,081,620 | †6,179,614 | 1,333,000 | 876,752 | †9,414,620 | †7,056,366 |
| Oklahoma | 1,225,550 | 1,087,245 | 703,200 | 405,593 | 1,928,750 | 1,492,838 |
| Oregon | †1,459,740 | †1,413,427 | (*) | (*) | †1,478,990 | †1,432,677 |
| Pennsylvania | 7,676,780 | 9,164,379 | 657,560 | 730,716 | 8,334,340 | 9,895,095 |
| Porto Rico | 29,520 | 59,386 | (*) | (*) | †29,520 | †59,386 |
| Rhode Island | 183,130 | 301,011 | 2,410 | 4,159 | 185,540 | 305,170 |
| South Carolina | 1,223,440 | 1,610,087 | 110,690 | 84,396 | 1,334,130 | 1,694,483 |
| South Dakota | †105,800 | †145,231 | (*) | (*) | 132,760 | 152,672 |
| Tennessee | †1,097,190 | †1,086,699 | 374,030 | 291,299 | †1,471,220 | †1,377,998 |
| Texas | †1,504,350 | †1,263,843 | †959,810 | †650,965 | †2,464,160 | †1,914,808 |
| Utah | 470 | 291 | 180,190 | 109,575 | 180,660 | 109,866 |
| Vermont | 56,660 | 77,448 | ..... | ..... | 56,660 | 77,448 |
| Virginia | †1,692,880 | †1,737,478 | †921,450 | †753,537 | 3,108,750 | 2,947,680 |
| Washington | 1,452,470 | 1,310,947 | 66,440 | 53,933 | 1,518,910 | 1,364,880 |
| West Virginia | †644,710 | †667,473 | 506,910 | 375,990 | †1,151,620 | †1,043,463 |
| Wisconsin | †2,637,570 | †2,393,300 | 350 | 310 | †2,637,920 | †2,393,610 |
| Wyoming | †52,970 | †92,240 | (*) | (*) | 60,600 | 94,929 |
| Undistributed | 852,670 | 980,980 | 1,207,050 | 940,927 | 1,345,460 | 1,322,422 |
| | 74,293,090 | $77,347,379 | 12,817,800 | $10,206,975 | 87,110,890 | $87,554,354 |

*Included under "Undistributed." †To avoid disclosing confidential information certain totals are somewhat incomplete, the figures not included being combined under "Undistributed."


DISTRIBUTION CHEMICAL LIME
USE SCALE AT RIGHT
PRODUCTION CURVE
USE SCALE AT LEFT
DISTRIBUTION CONSTRUCTION LIME*
USE SCALE AT RIGHT
USE SCALE AT RIGHT
DISTRIBUTION AGRICULTURAL LIME
PRODUCTION-THOUSANDS OF TONS
DISTRIBUTION-THOUSANDS OF TONS
JUNE JULY AUG. SEPT. OCT. NOV. DEC. JAN. FEB. MAR. APR. MAY JUNE JULY AUG.
* DOES NOT INCLUDE FINISHING LIME.
CURVES BASED ON 43% OF TOTAL LIME PRODUCTION.

***Operations of lime industry for 14 months***

## Lime Statistics

THE ACCOMPANYING CHART shows statistics of operations in the lime industry for a 14-month period ending in August, 1931.

This information, supplied by the National Lime Association, represents only 43% of the total lime production of the country. Reasonable accuracy in estimating total production and distribution should be obtained from it by doubling the amounts shown in the chart.

## Boy Asks Damages for Injuries from Blasting Cap

ORLAND GRAFF, 17, who lost his left hand and suffered severe injuries around his left hip when a blasting cap, obtained at a quarry, south of Marion, Ohio, exploded in his pocket July 1, 1930, has brought suit against Clifford Owens, owner of the quarry, asking $50,000 damages.—*Columbus* (Ohio) *Citizen.*

## Offers Aggregate with Permanent Easement

CLEARING THE WAY for immediate construction of the first of the new San Gabriel dams, and providing for a possible saving of between $1,000,000 and $3,000,000 in the cost of the structure, John M. Martin, attorney for the San Gabriel Canyon Development Co., Los Angeles, Calif., has submitted to the board of supervisors an offer which is expected to avoid litigation of the company's $1,500,000 gold claims in the canyon.

Under the terms of the offer, the company will sell to the flood control district a permanent easement sufficient to build the dam and all appurtenant structures for $175,000.

In addition, the company will agree, according to Mr. Martin, to supply the district with all sand, rock and gravel needed for construction of the dam without cost, other than that of excavating it out of the stream bed.—*Los Angeles* (Calif.) *Illustrated Daily News.*

## Superior Portland Cement, Inc., Adopts Six-Hour Day

A RADICAL CHANGE in the working schedule at the Concrete, Wash., plant of Superior Portland Cement, Inc., was put into effect September 14.

Under the new plan all employes will work six hours a day for five days a week, four six-hour shifts taking the place of the former three 8-hour shifts. Wages will remain at the same rate per hour. The net result will be that the daily earnings of the workmen will be reduced by 25% a day, but that more men will be given employment.

The company faced the alternative of shortening the working day or laying off a considerable number of men. The slack season in the cement industry is approaching, and much work that had been under way through the summer would be suspended until next spring. Under normal conditions, these men would be laid off, and would find other work until they were taken on again. As there is no other work available at this time, the company officials considered that it would be better for the entire community if these men could be retained on the pay roll through the shorter working day, rather than to keep the regular crew on the old schedule and laying off the others.

While no statement has been given out by the Superior officials, it is generally believed that the new schedule is only temporary and that the former shifts will be resumed as soon as business conditions warrant. The business depression has hit the cement industry as well as all other lines, but the officials of the Superior company desire to relieve conditions in Concrete as much as possible, and believe that the new plan will prove of the greatest benefit to the greatest number in the long run.—*Concrete* (Wash.) *Herald.*

## Iola Plant of Lehigh Adopts Six-Hour Shift

ONE HUNDRED AND FORTY MEN employed at the Iola, Kan., plant of the Lehigh Portland Cement Co., have started upon a 6-hour working day basis, according to an announcement made recently. Instead of three 8-hour shifts, the plant will be operated with four 6-hour shifts. No men will be laid off.

The reason for the change of policy was said to be the company's wish to continue operation as long as possible without laying off any men. The plant's production will be reduced to a 3-kiln basis, also.

No new men will be required to fill out the extra shift, it was said.

Although nothing certain could be said as to how long the plant would operate this winter, it was indicated the curtailment plan would make possible a longer period than otherwise would be the case.—*Iola* (Kan.) *Register.*

## Building Modern Gravel Plant in Michigan

EXCAVATION work was started recently for a large and modern gravel washing, storage and loading plant in Grand Rapids, Mich., according to the *Grand Rapids* (Mich.) *Herald.*

The plant is being constructed by Owen, Ames, Kimball Co., general contractors, for a group headed by William J. Breen. It is understood unofficially that the project involves approximately $100,000.

The plant owners have acquired considerable property. The project consists of a modern washing plant, four concrete storage bins and a loading dock on the Pere Marquette tracks opposite the plant.

The raw gravel will be conveyed under Wyoming road to the plant through a tunnel. The graded sand and gravel also will be conveyed under Grandville road through another tunnel to loading docks on the railroad. The plant also will contain facilities for loading trucks direct from the storage bins. All operations from the time the gravel leaves the ground until it is loaded will be handled by modern equipment.

Mr. Breen has been affiliated with the Hersey Gravel and Construction Co. for some time. However, it is understood that the new plant will be operated under the name W. J. Breen Gravel Co. There are large deposits of gravel available on the land controlled by the company.

## Reports on Southern Cement, Sand and Gravel in 1931

AFTER ADVANCING STEADILY from January through June, cement shipments declined for the second successive month in August, reflecting the recession in road building as projects were completed and funds exhausted. Road construction and other public work have largely sustained the southern cement industry this year. For the first eight months, however, shipments were 167,000 bbl. ahead of the same period last year. The sand and gravel business of the Montgomery district has been about equal in volume to that of last season, it is stated, but prices were considerably lower and the market more or less demoralized.—*The Dixie Manufacturer.*

## Refuses Bids After Cut in Gravel Budget

ALTHOUGH they received a dozen bids on gravel in three townships, the county commissioners at Kokomo, Ind., refused to open any of them. The decision not to buy any of the material was made by the board after it had discussed the reduction in its gravel budget for next year of from $30,000 to $15,000, which cut was made by the county council.

The board had advertised to buy 12,000 cu. yd.—*Kokomo* (Ind.) *Tribune.*

## County Commissioners Favor Prepared Gravel

A DIFFERENCE of opinion over the question of the purchase of and price to be paid for gravel for maintenance of Marion county, Ind., roads has entered into the controversy over the county's road improvement program for next year.

George Snider, president of the board of county commissioners, and Dow W. Vorhies, Democratic member, recently signed a contract with W. C. Halstead, a gravel contractor, for the purchase of 5000 cu. yd. of gravel at 90c. a yd. Under terms of the contract, this is to be washed gravel of a specified size and grade best suited for use on roads, they said. The price, although considerably higher than that at which pit run gravel on Marion county farms can be bought, represents the best quotation available on the grade for which the county is contracting, they contended.

John E. Shearer, third member of the board of commissioners, who opposed the awarding of the contract, contended that gravel suitable for road purposes could be bought at prices ranging from 20 to 40c. a yd. Gravel could be bought from one pit within two mi. of the Halstead pit at a price considerably lower than the contract figure, he said.

Gravel bought at the lower figure is pit run and unfit for use in maintaining roads, Harry Dunn, county auditor, said. He said the cost to the county of removing surface dirt and of hauling the gravel from the pit pointed out by Mr. Shearer, which is outside the county and far from the center of road maintenance activities, would increase the purchase cost materially.

The contract with Mr. Halstead provides that the gravel is to be "dipped and grisled or washed and run through a 1½-in. screen and over a No. 5 screen and not to exceed 30% sand." Mr. Halstead must maintain a road from the pit to the county road and is to be paid as the gravel is used.

"The contract with Mr. Halstead," Mr. Snider said, "was signed because his gravel of the grade specified in the contract was the most economical for use in that part of the county, considering hauling costs, and because it was necessary to reduce an original contract for 20,000 yd. of gravel from his pit.

"Gravel has never been offered to the county for 20c. a yd. The commissioners were unable to find usable gravel that can be delivered to roads in Washington township for less than the 90c. price paid to Mr. Halstead," Mr. Snider said.

Charles W. Mann, county highway superintendent, recommended purchase by the county of equipment to remove surface dirt from gravel pits. Messrs. Snider and Vorhies objected, saying that the county previously has tried the experiment and found it to be uneconomical.—*Indianapolis* (Ind.) *News.*

## Asks Lifting of Receivership for Illinois Electric Limestone Co.

AFTER attorneys for the Illinois Electric Limestone Co., St. Louis, Mo., sought to have a receivership placed against the company set aside and the counsel for the petitioners who brought about the action, resisted their efforts before Federal Judge Fred L. Wham at East St. Louis, Ill., recently, the court took the matter under advisement, decision to be handed down later.

The limestone company operates a quarry at Falling Springs, Ill., and is managed by George G. Moore, a New York capitalist. It was a part of the development plans of the company to start a strip mine at St. David, Fulton county, Ill. Mr. Moore, the petitioners charge, mismanaged the east side venture. The petitioners are Howard A. Swallow, a minority stockholder; John H. Willett, a judgment creditor, and T. E. Toenniges, described as a contract creditor, all of whom live in Danville, Ill.

The receivers are Charles P. Tigges, Louis Clements and Ralph P. Jacoby.

The petition alleges that the Illinois limestone concern has debts of $200,000 made up chiefly of overdue bills for power, rent and salaries.—*East St. Louis* (Ill.) *Journal.*

## Installs Equipment to Produce Sand from Quarry Waste

W. J. SPROW of the Wagner Quarries Co., Sandusky, Ohio, has returned from Milwaukee where he closed contracts for the purchase of machinery from the Allis-Chalmers Manufacturing Co., and which will be delivered shortly and placed in operation at the Wagner plant at the Soldiers' Home.

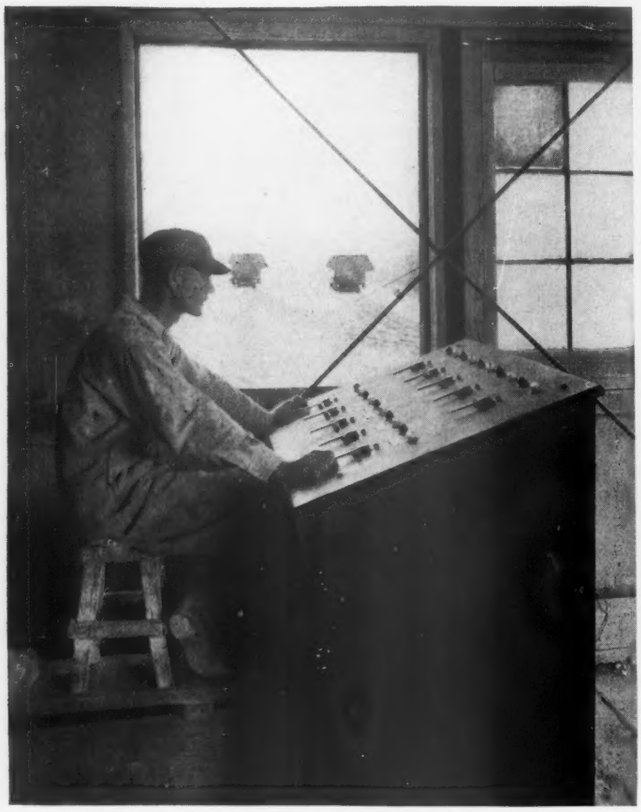
The machinery will be used in the manufacture of sand made from waste products of the quarry. This sand is used as a substitute for lake sand and is said to be in big demand for many uses. The machinery which Mr. Sprow has purchased for use here will manufacture 1000 tons a day.

It was said that the new type of sand will enable the company to utilize much of its waste material and at the same time provide a product that has large sales possibilities. Manufacture of the sand is slated to start shortly.—*Sandusky* (Ohio) *Register.*

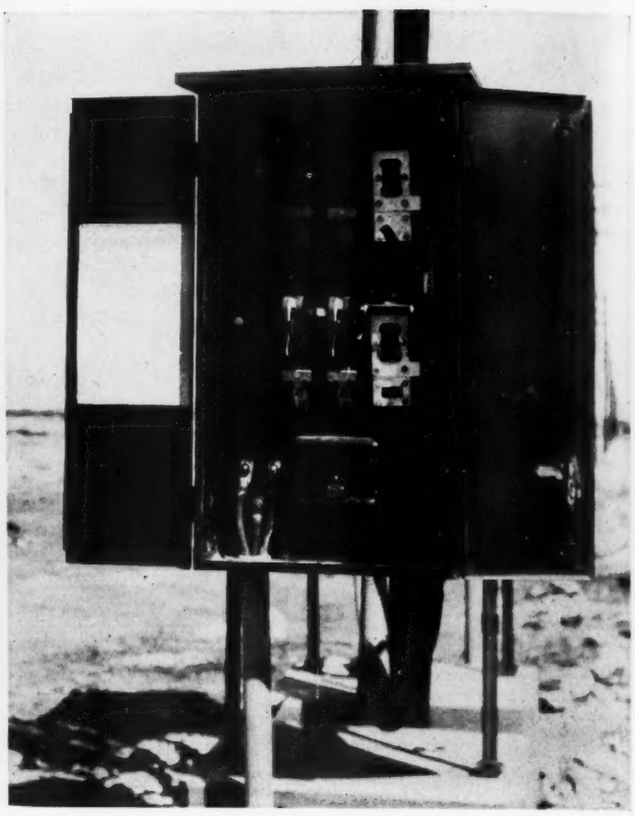
## New Texas Company Plans Gravel Development

NOTICE of the granting of a charter to the Jones County Gravel Company of Abilene, Tex., is announced. Incorporators are Henry Sayles, Jr., E. B. Sayles and C. M. Sayles. Capital stock is $20,000.

Organization of the concern is a "preliminary step looking forward to the development of a large deposit of commercial gravel in the vicinity of Abilene," Henry Sayles said. —*Abilene* (Tex.) *Reporter.*



*Control desk at crusher house*



*Contactor box through which track is energized*

# New Quarry Haulage System Uses Alternating Current

## Interesting Installation at Dallas Plant of the Trinity Portland Cement Co.

DURING THE FALL of 1930 the Trinity Portland Cement Co. put into operation at its Dallas, Tex., plant a new electric haulage system between the quarry and the crusher to replace the steam locomotives and cars formerly used, and at the same time installed an electric shovel to replace the steam shovel previously used.

These changes are understood to have worked out satisfactorily and the haulage system is particularly interesting as being the first installation of its kind.

The system was developed and furnished by the General Electric Co., according to plans of the cement company's organization, and the cars and car dumping equipment were furnished by the Atlas Car and Manufacturing Co., Cleveland, Ohio.

The principle involved is similar to that of the Woodford electric haulage system, used in quite a number of quarries, but this is understood to be the first quarry installation using alternating current. Three phase, 25 cycle, 220 volt alternating current is used, and the track is sectionalized as in the Woodford system.

The railway line from the quarry to the crusher has a length of approximately 1 mile with a passing track near the crusher, and about a half-mile of double track along the quarry face.

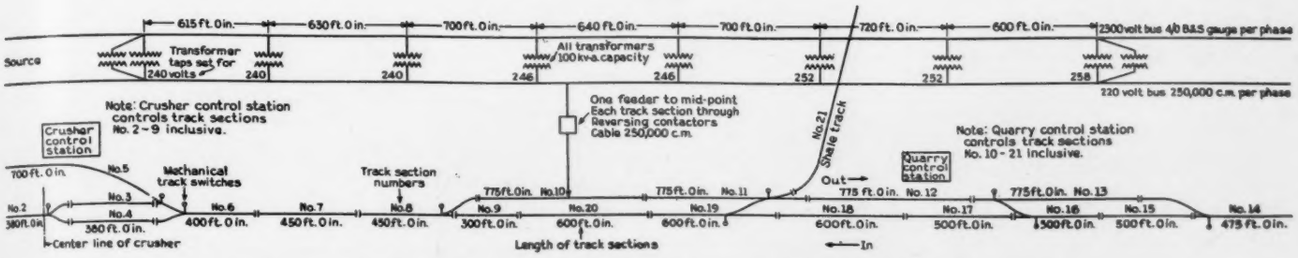
The track is standard gage, of 56-lb. track rails on wooden crossties, and with two 40-lb. third rails about equally spaced between the track rails. These third rails are divided into sections of various lengths, the control equipment being arranged for a maximum of 20 sections.

The operation is handled from two control desks or boards, one located in a tower midway along the quarry face and one in the crusher house, each controlling about half of the trackage.

Control of the car on any section of track is by means of the corresponding switch on the control desk. This is a double throw switch having three positions, *in, off* and *out,* and connected by control wires with two 2-pole magnetic contactors, or switches, located in a weatherproof steel box alongside the corresponding track section. The contactors connect the two third rails of the section with a 220-volt power line alongside the track, the third phase being permanently connected to the track rails.

Power for the system comes from a 2200-volt, 3-phase line on poles paralleling the track. It is generated by the waste heat boiler installation at the cement plant. The 220 volt, 3 phase line on the same poles, and which is tapped in to the contactors as already mentioned, is supplied from the 2200-volt line through ten 100 k.v.a. 3-phase transformers equally spaced along the line.

The 2200-volt line also provides power for a 2½-yd., 50-B Bucyrus caterpillar type


615 ft. 0 in.
630 ft. 0 in.
700 ft. 0 in.
640 ft. 0 in.
700 ft. 0 in.
720 ft. 0 in.
600 ft. 0 in.
2300 volt bus 4/0 B&S gauge per phase
Source
Transformer taps set for 240 volts
All transformers 100 kv-a. capacity
220 volt bus 250,000 c.m. per phase
Note: Crusher control station controls track sections No. 2 - 9 inclusive.
Crusher control station
One feeder to mid-point
Each track section through
Reversing contactors
Cable 250,000 c.m.
No. 21 Shale track
Note: Quarry control station controls track sections No. 10 - 21 inclusive.
Quarry control station
Out
In
Mechanical track switches
Track section numbers
Length of track sections
Center line of crusher
700 ft. 0 in.
380 ft. 0 in.
400 ft. 0 in.
450 ft. 0 in.
450 ft. 0 in.
775 ft. 0 in.
300 ft. 0 in.
600 ft. 0 in.
600 ft. 0 in.
775 ft. 0 in.
775 ft. 0 in.
600 ft. 0 in.
500 ft. 0 in.
500 ft. 0 in.
500 ft. 0 in.
475 ft. 0 in.

***Layout of quarry haulage system at Dallas, Tex., plant of Trinity Portland Cement Co.***

electric shovel with Ward-Leonard control which is used for loading in the quarry

Four 10-yd. steel cars are used, with V-type bodies pivoted for dumping on one side.

Each car is equipped with two 50-hp., 750 r.p.m. squirrel cage induction motors geared to the axles to give a car speed of about 13 mi. per hr. These motors were especially designed for traction service and are similar to those used for operating elevators in buildings.

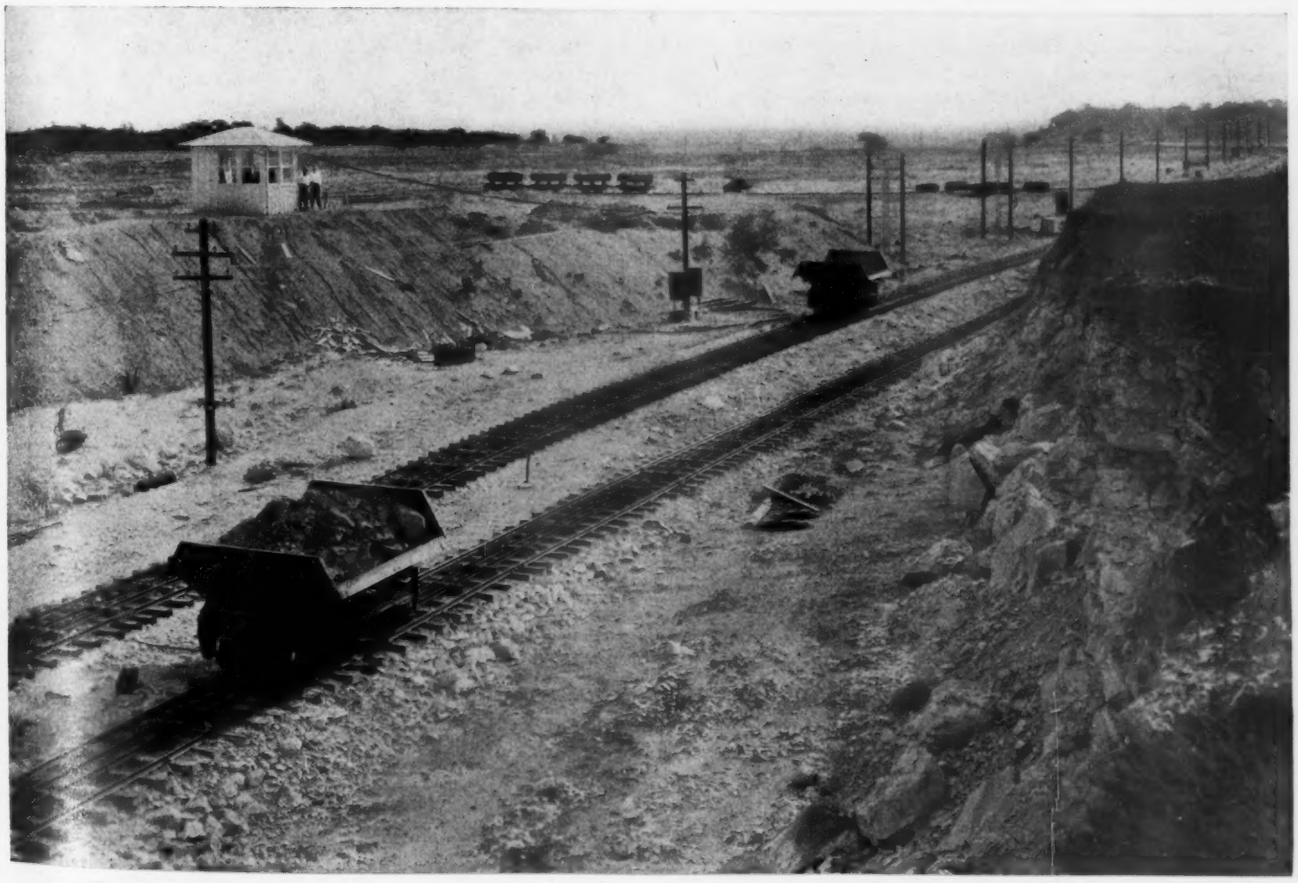
The 3-phase power is fed to them directly from the rails, one phase through the wheels and the other two phases through current-collecting shoes sliding over the third rails. Two shoes, one at each end of the car, bear on each third rail and are connected directly with the motors by leads without any contactors or control devices whatever.

The motors are arranged with solenoid brakes which automatically stop the car when the power is cut off. In starting, they are thrown directly on the line by means of the contactors already mentioned, no resistors or other starting equipment being used.

### *General Features*

This simplification through the use of squirrel cage motors which are thrown directly on the line, and the absence of all slip rings, commutators, brushes and starting equipment, is said to reduce upkeep to a minimum. Also the transformer loss of only about 2 or 3% with alternating current is said to effect a considerable power saving over the approximately 20% power loss through a motor-generator set where direct current is used. A further advantage claimed for this system is that a car going down grade is braked or held down to normal speed by the motors generating current back into the line, instead of current being used through resistors to hold down the speed of the car. However, over against these advantages of simplification and lower power consumption, the system does not have the speed control possible with the direct current system.

In other words, the cars either accelerate rapidly and run at full speed or they stop under the action of the brake when the power is cut off. They can of course be "inched" along but not with the smoothness of the direct current system, nor can they coast without power. This limitation, however, has not been found to be a serious matter in this particular instance except perhaps in the handling of the shale. In fact, the trackage is of necessity probably kept in better shape and more tons of stone handled in a given time because of the inability to run the cars at reduced speeds over any poor sections of track.



***Looking from quarry face toward control tower, showing full and empty cars passing. Transformers and contactor cabinets are located alongside track***

*Electric shovel loading 10-yd. motorized car*

The shale is handled intermittently at present by using the motorized cars to haul trains of three contractors' type side dump cars to the shale storage shed, where there are no facilities for dumping the motorized cars. In such operations as coupling up and handling these cars at the dumping point there is not the smoothness of the direct current system.

### *Operating Results*

As at present installed, with four cars in operation, this installation has a hauling capacity of 15 cars or 150 tons of rock per hour with a power consumption up to about 70 kw.h. per hour.

On one test, operating over a distance of 4500 ft. and with the cars averaging a 10-ton load each, the power consumption was .54 kw.h. per ton mile. Another test over a four hour period and operating over one mile of track showed a power consumption of 256 kw.h. in handling 580 tons of rock, or .44 kw.h. per ton mile. The power used by the shovel over this same period was at the rate of 36 kw.h. per hr. or 0.25 kw.h. per ton.

### *Methods of Control*

The car movements are controlled by two men, one at the crusher and one at the tower overlooking the quarry, each controlling about one-half of the track system. In each case the sections controlled are visible from the respective stations.

Moving the desk switch for any section to the *in* position energizes the corresponding magnetic contactor beside the track and connects the third rails of that section with the 220 volt power line; moving it to the *out* position energizes a second contactor with the two phases reversed and applies the power in the other direction; while in the *off* position the contactors are both open and the section is dead. The magnetic contactors are energized from the 220 volt line, and the two sets of contactors in the same box are interlocked mechanically so that they cannot both be thrown in at the same time.

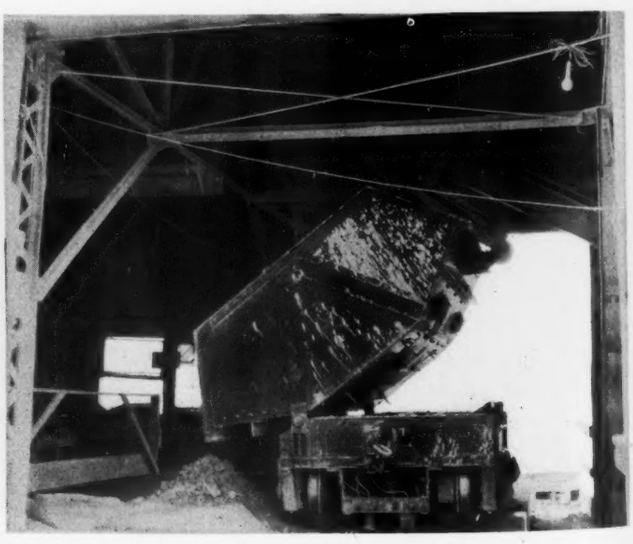
Thus a car on that section is stopped or is moved in either direction by simply turning the small control switch to any one of the three corresponding positions. Small red and green lamps at each switch, which light when the power is on in either direction, help to warn the operator that the section is energized.

### *Wiring*

The wiring installation, as indicated by the preceding description, is quite simple, consisting of a continuous 2200 volt 3 phase line paralleling the track and a continuous 220 volt 3 phase line carried on the same poles. The transformers are permanently connected in multiple between the high voltage and the low voltage lines, while the contactors for each section of track are connected between the 220 volt line and the third rails. The control wires, which are of small size, are cabled and run on the poles from each control desk to the contactors of those track sections affected.

### *Track Details*

A number of details of the installation are of interest. The third rails are not spiked to the ties because of the resultant current leakage through the wet ties during rainy weather, but are supported above them and held in place at intervals by wooden blocking



*Switch arrangement with outside third rails at intersection, and dumping of 10-yd. car at crusher*

*Contactor box and transformer opposite car*

*Loaded and empty cars on passing tracks*

fastened to the ties as indicated in some of the illustrations.

In working out the track details it was found desirable to make a few changes from the original plan for the switches because of the interference and crossing of the third rails of different phases. While it had been at first intended to leave the intersecting point of the third rails open and let the shoes on the opposite ends of the car span the gap, this was found not to be practical because of the nearness of the rails of opposite phases, even when the gap was made as long as possible.

The problem was solved by installing at this point additional short sections of a rail length on the outside of the track on each side and mounting an additional collector shoe midway on each side of the car. Each of these outside shoes and each additional outside third rail was connected with the opposite inside third rail circuit to take care of this one phase at these crossover points. Continuous wooden blocking was then substituted for the inside third rails at these points to carry the sliding shoes over as indicated in one of the illustrations.

Spring switches are used at both ends of the passing track at the crusher and the double track along the quarry face and these are set so that the cars automatically follow the same course in making the round trip. Two cars are in transit, one each way, while one car is being loaded and one dumped at the crusher. The loaded car from the shovel is held on the double track section at the quarry end until the returning empty has passed.

The quarry floor is above the crusher level so that there is a down grade of about 3% on part of the trackage from the quarry to the crusher.

In order to permit the shovel operator to control the car movement during the loading operation a sub-control panel was furnished for connection in parallel with the quarry control board on those sections of the track nearest the shovel. This, however, has not been used, as the loading operation is near enough to the tower that the operator there has no difficulty in handling the car by visual signal from the pit man.

### *Dumping at Crusher*

At the crusher an interesting car dumping device is used which is both simple and effective. This consists of a long hook suspended from a trolley which is free to move on an inclined I beam extending over the car crosswise of the track at the dumping point.

The trolley is moved along the I beam by a wire cable which passes around a head sheave at the upper end of the I beam, thence down and around a drum hoist and back to the trolley. The drum hoist is driven by a direct connected 30-hp. motor of the same type as is used on the cars and is actuated by a switch of the same type as the others on the control desk.

Thus as the trolley moves over and up the hook engages a pin on the side of the car and the car body is tilted and emptied to the crusher. The movement of the hook is positively controlled in either direction so that the car body may be held in any position to regulate the feed to the crusher.

A 36-in. by 60-in. Fairmount single roll primary crusher is used and from this the crushed material is carried on an inclined pan conveyer to a Williams pulverizer, and by belt conveyor to the raw storage shed.

### *General*

The Trinity Portland Cement Co. also uses a direct-current quarry haulage system at its Fort Worth, Tex., plant, which was furnished by the Woodford Engineering Co. a number of years ago. Both haulage systems are operating satisfactorily and at lower costs, it is understood, than with the steam locomotives formerly used.

The general offices of the company are in the Santa Fe Bldg., Dallas, Tex. W. H. L. McCourtie is president; C. E. Ulrickson, vice-president; O. V. Bartholomew, general superintendent; and J. W. Ganser, assistant superintendent and chief chemist. William O. Stuart was in direct charge of the electrical part of the installation.

## Street Repaving Help to Jobless

THE MAKING OVER of old streets to accommodate modern traffic and the improvement of unpaved suburban streets is a much needed development in most of the cities that have expanded rapidly during the past decade, according to G. B. Sowers, commissioner of construction and engineering of Cleveland, Ohio, and president of the city officials' division of the American Road Builders' Association.

"Much of the unemployment is in cities and street construction is a tried and tested method of relief," said Mr. Sowers. "Moreover, three-fourths of the money spent for equipment and materials is ultimately paid out for labor in the quarries, machine shops and factories.

"The poor streets of municipalities cost the taxpayers and motorists more than if the streets were improved. At the present time materials can be purchased at such bargain prices that the low cost tends to offset the interest charges if money is borrowed to improve the streets. There is an excellent market at the present time for good municipal bonds," he continued.

"In view of the economies possible at the present time and the urgent need for better streets, not to mention the relief of unemployment, it seems highly probable that many city councils will borrow money for street building and resurfacing," he concluded.

## Geology in Ukraina

THE SEVENTH ISSUE of contributions to general and practical geology in Ukraina by R. Virgicovsky has been issued by the district geological research administration in Ukraina.

This issue gives some general conclusions on the geology of the region and describes in very complete detail the conditions of embedding of layers and primary phosphorites. This study has many interesting illustrations of unusual geological structures of the area.

## Helping Solve Unemployment for Mining Engineers

THE IDEA that each industry should take care of its own unemployed—but how—is gaining ground and it is interesting to note how the Colorado School of Mines Alumni Association is helping to take care of its unemployed graduates.

The association has formed a corporation called, "Engineer's Lease, Inc.," with a capital of $50,000 consisting of 5,000 shares at $10 per share. The purpose of the corporation is to lease and operate gold mines using the Mine's School men that are at present unemployed. Employed members of the Alumni Association and others are being asked to subscribe to this stock.

Leases are secured from the mining companies or owners on a "split check" basis. Under this system the mining company owning the ground furnishes the supplies, equipment, etc., and the Engineers Lease, Inc., furnishes the labor, engineering skill and management. The net mill return from the ores extracted is divided equally between the mine owner and the Engineer's Lease, Inc.

The first mine leased was a portion of the old Vindicator mine at Cripple Creek, Colo. This ground will be sub-leased to the graduates under an arrangement that the net mill return received by Engineer's Lease, Inc., will be divided as follows: two-fifths to the men who are stock holders in Engineer's Lease, Inc., two-fifths to the men who do the work and one-fifth to the Alumni Association. All graduate students of the Colorado School of Mines who want work are eligible and will receive compensation and a share in the profits in proportion to the number of days worked. Other mines will be leased later if advisable.

The graduate miners are given a "grubstake" of $1.25 per day which is deemed sufficient for their daily "eats" and lodging and any compensation above that must come from the mining venture.

In operation, the system will mean that the student workmen will be given certain sections of the mine to explore. By following geological indications, stringers of ore, etc., new ore bodies of economic value are hoped to be developed. Once discovered the ore will be taken out by the men and sold to the Golden Cycle mill at Colorado Springs, a company that purchases gold bearing ores.

The Cripple Creek district of Colorado has, in the past, been the scene of many developments of bonanza proportions and is still a fertile field for exploration. We hope that the sincere and novel effort being made by the Colorado School of Mines in its effort to relieve local unemployment will be rewarded by another "strike."

## Minnesota Takes Bids on 1932 Road Projects

OPENING OF BIDS for cement for a major part of Minnesota's 1932 paving program was announced recently by Charles M. Babcock, state commissioner of roads.

The tentative program calls for 428 mi. of 20-ft. concrete highways, requiring 1,729,000 bbl. of cement. A few projects may be added, if favorable prices are received on construction, but Mr. Babcock pointed out that high prices or other events might bring revisions.

"Cement is purchased separately by the state," the Commissioner said, "and bids were called for largely as an aid to unemployment as the cement mills can continue work during the winter, grinding and storing cement, if they have orders for 1932."

Bids on pavement construction will be opened in the fall and winter, so that work can start as soon as spring permits, Mr. Babcock said. The contractors furnish labor and all material except cement.

Besides boosting employment the state, by purchasing cement now, is taking advantage of low cement prices. The contracts, however, contain a provision that, if market prices go lower, the state will get the benefit of the prevailing prices.

The list of proposed paving jobs is about 40 mi. more than the highway department had on its program when the bond issue bill was being advocated last spring. The increase is made possible by lower prices on contracts and materials, and lower interest on bonds than anticipated.—*St. Paul* (Minn.) *Dispatch.*

## Pennsylvania Improves 1,000 Miles of Highways

THE STATE HIGHWAY DEPARTMENT of Pennsylvania has announced that the mileage of roads improved during the present season passed the 1,000-mile mark during the past week. With the completion of 123.28 miles in the last week the season's total was raised to 1,080.96.

The state's road program afforded employment for 21,790 men, the Department's report stated. Departmental maintenance forces had 16,672 persons on the pay roll and contractors 5,118.

## Contracts Output of Slag

THE BIRMINGHAM SLAG CO., Birmingham, Ala., has contracted to handle the entire output of the slag plant of the Sloss-Sheffield Steel and Iron Co., with the exception of tonnage required for certain existing contracts and for the ready mixed cement plant.

This arrangement marks the withdrawal of Sloss-Sheffield from active participation in the commercial slag market.—*The Dixie Manufacturer.*

## Recent Prices Bid and Contracts Awarded

*Victoria, B. C.* Stewart and Barber, Ltd., has been awarded contract by the provincial government for supplying 11,000 cu. yd. of crushed surfacing gravel at 74c. per yd.

*Franklin, Ky.* A contract for 12,000 tons crushed stone to cost $1.07 a ton, to be used in surfacing the Morgantown road, a distance of 12 miles, has been awarded to Waters and Co. The work will start about October 10.

*Marysville, Kan.* Contract for 14,650 cu. yd. of gravel to be laid on Marysville-Oketo benefit district road No. 14 was let by the county commissioners here recently to the Blue Rapids Gravel Co. for $1.20 per cu. yd. The project is 12.1 miles.

*Dalton, Ohio.* The county commissioners here have contracted for the graveling of Sugar Creek township roads, viz.: Road No. 188, west from Kidron road to Apple Creek, was bid in at 91c. per ton by Ed. Uhl, who also bid in the Sonnenberg road at 83c. per ton; the west Moscow road south from Lincoln highway was sold by A. J. Diana of Canton for 88c. ton.

## Aggregate Concerns Merge

CONSOLIDATION of the Ohio River Sand and Gravel Co., Paducah, Ky., and the Edward Hely Stone Co., Cape Girardeau, Mo., under the name of the Federal Material Co., has been announced by A. J. Hoffman, Louisville, president of the new company.

Mr. Hoffman said the valuation of the combined plants is in excess of $1,000,000 and the company plans to acquire other plants in the Mississippi valley district.

Both the Paducah and Cape Girardeau plants are over 30 years old. Mr. Hoffman said offices and plants will be retained in both cities, although the main office probably soon will be located in Louisville. The company's headquarters now are in Cape Girardeau.

The Paducah plant supplies western Kentucky and Tennessee with washed sand and gravel. It formerly was owned by Capt. Robert Noble. The quarry at Cape Girardeau employs more than 300 men. Mr. Hoffman said his company has sufficient business contracted for to keep both plants operating at full time.

The principal business of the Federal Material Co., Mr. Hoffman said, will be to supply federal and river improvement contractors with rip rap and other stone for river improvements.

Officers of the company besides Mr. Hoffman are Norman L. Hely, Cape Girardeau, vice-president, and H. L. Wells, Louisville, secretary and treasurer.

Mr. Hoffman some years ago formed the Kentucky Consolidated Stone Co., of Louisville, with numerous plants over the state.

# Cement Products

TRADE MARK REGISTERED WITH U. S. PATENT OFFICE

# Laying Highway With Ready-Mixed Concrete

## Ontario Ready Mix Concrete, Ltd., Locates Plant Near Job and Mixes in Transit

CANADIAN highway officials, road contractors and engineers are interested in the work that the Ontario Ready Mix Concrete, Ltd., is doing on the Kings Highway No. 23 between Atwood and Kennecott, Ont., for on that job the Transit system of mixing and placing concrete is being used for constructing the highway in place of the conventional paver and batching system.

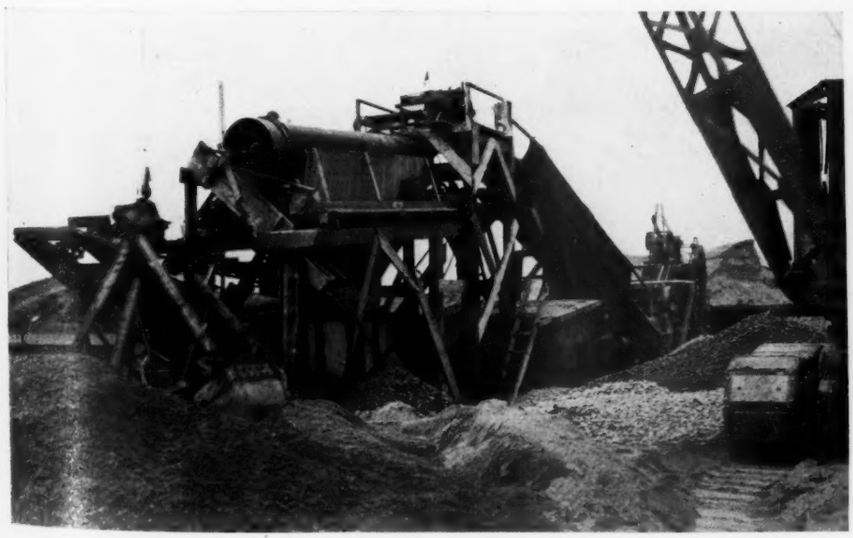
The use of Transit mixing trucks for this purpose was said to be one of the first instances of such a novel procedure for rural highway construction in North America and most certainly so for the Canadian provinces.

The highway contract in question is known as the Kennecott contract and covers a length of 9 miles of 20-ft. concrete road which is 10-in. thick at the edges and 7-in. thick at the center.

The contract for this work was made with the Ontario Ready Mix Concrete, Ltd., Toronto.

A short distance from the construction job a sand and gravel pit was opened up and a semi-portable washing and screening plant installed. For digging the pit material a ¾-yd. Erie steam shovel was installed and trucks were used for transportation between the pit and the washing plant. At times the ¾-yd. shovel is used for grading the highway roadbed and at such times a Barber-Greene portable loader digs and loads the trucks.

*Semi-portable sand and gravel plant*



*The sizing screen makes a coarse aggregate as oversize with the fines passing to the sand drag*

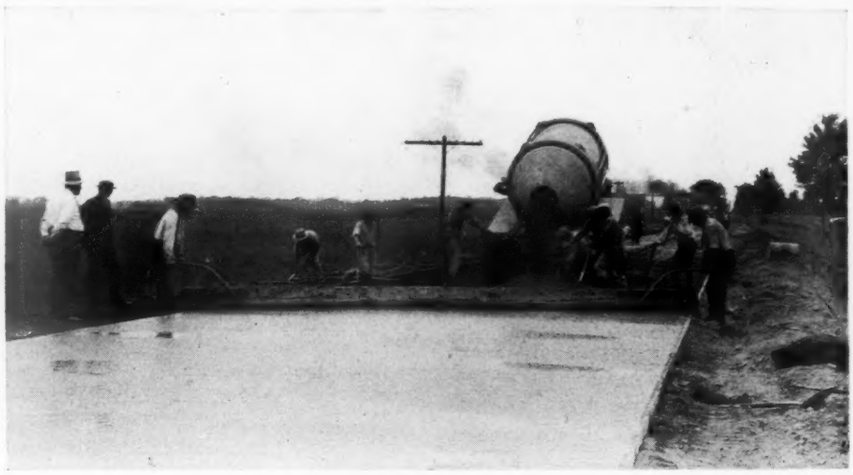
The trucks discharge to a hopper which is covered with a grating and empties to an apron conveyor. This elevates and delivers the gravel to a short scalping screen. The oversize from this screen falls to a 9-in. by 36-in. Cedar Rapids jaw crusher, where it is crushed and the fines from the screen, along with the crushed product, fall on to a short inclined belt conveyor serving a 16-ft. Champion rotary screen. The oversize from this rotary screen is the coarse aggregate. The fines from the rotary screen fall to a sand drag which produces the fine aggregate. Both of these products discharge to ground storage, where a Koehring crane with a 40-ft. boom picks the aggregates up and delivers them to Butler bins. The bins are provided with Butler weighing equipment, batching to the Transit mixer trucks.

***Batching plant, with transit mixers waiting their turn to be charged***

The cement is handled in bags and for every 4-yd. batch of concrete 26 sacks of cement are used. Water is added at the plant so that the concrete is being mixed from the time it leaves the plant until it is delivered to the job. The average haul is roughly 4½ miles.

The truck, on arriving at its destination, backs to where the work is going on and discharges its load between the forms, after which the concrete is handled the same as on any concrete highway job.

The country through which the highway passes is a flat farming district with the soil a dark colored loam, almost a gumbo, so that the daily yardage is dependent to a great extent upon climatic conditions. In other words, a heavy rain would, owing to the nature of the road, almost stop the laying of concrete until the road had dried out somewhat. Hence the per day lineal footage varies considerably, 1270 ft. being the most that had been laid in one working day of 10 hr. There is no particular reason why this footage cannot be maintained other than the reason already mentioned.



***Placing the concrete***

***Portable loader in the pit***

Highway 23 through this section of the country, prior to this improvement, was an 18-ft. gravel road and had been in use for some considerable time and was quite traffic bound, but in several places small humps, a foot or so in height, were graded out and after a preliminary dressing of gravel the concrete was laid upon this sub-grade. The trucks in normal weather have no difficulty with this part of the job. Mesh reinforcing was used in the concrete roadbed where the original foundation was broken through.

The great advantage of such a system of laying concrete is in the superior quality of the concrete produced. It was said that the concrete laid on this contract developed in 7 days a strength equivalent to 21-day concrete made in the ordinary paver. The reason for this greater strength was said to be due to the longer mix which the concrete received.

***Part of completed roadway***

The Ontario Ready Mix Concrete, Ltd., of Toronto formerly operated under the name of the Toronto Ready Mix Concrete, Ltd., with plants at Ottawa and Niagara Falls, Ont.

C. E. Reynolds is president of the company and R. B. Young is consulting engineer. B. Weese is superintendent of the construction job at Kennecott. Mr. Young is well known in the ready-mixed concrete industry and is one of the directors of the National Ready Mixed Concrete Association. Mr. Reynolds controls the Canadian patent rights to the Transit mixing system. The head offices of the company are at 159 Bay street, Toronto, Ont., Canada.

## To Open Concrete Pipe Plant in Ohio

ANNOUNCEMENT was made recently that Sandusky, Ohio, will have another new industry, the Universal Concrete Pipe Co., of Pittsburgh, a concern that manufactures reinforced pipe. The company will employ 30 or 40 men and plans to start operations about November 1.

The new concern has leased three acres of ground from the Wagner Quarry Co.

The concern is now operating plants in Columbus, Pittsburgh and Cleveland.

The deal with the company for leasing of land here was closed by W. J. Sprow of the Wagner Quarries Co.—*Sandusky* (Ohio) *Register*.

## Building Rock Mixing Plants in California

CONSTRUCTION is proceeding rapidly on the cold asphalt rock mixing plant south of Brawley, Calif. The plant is expected to begin operation soon.

A hot asphalt rock mixing plant also is being constructed in Calexico. The supply of rock for both these plants will be quarried at Truckhaven on the Salton Sea highway.—*San Diego* (Calif.) *Union*.

## Canada Adopts Road Building for Its Unemployment Relief

A BROAD PROGRAM of emergency road building has been adopted by the Canadian Government for unemployment relief, according to W. R. Smith, president of the American Road Builders' Association. Heads of families are to be given work as near home as possible, but many unattached workers will be sent into the Northwest to labor on the Canadian transcontinental highway.

"A current editorial in the Washington Post sums up the procedure in the Canadian road building program," states Mr. Smith. "Improvements will be in charge of the provincial administrations, as a rule, but the Dominion will render financial aid. In the road camps men will be paid $2.40 a day, from which 80 cents will be deducted for food and 50 cents a month for hospital service.

## Establishes Cement Products Plant in Montana

ANOTHER home product is to be manufactured in Kalispell, Mont., according to the plans of Kirkpatrick Bros. It is planned to establish cement products plants there that will be turning out tile, sewer pipe, culverts and other concrete products next spring that will give employment to from six to ten men.

Kirkpatrick Bros. have been known in the contracting field for many years.

Some time ago Kirkpatrick Bros. purchased the chemical plant at Eureka. The plant will be dismantled and all the machinery that can be used in the concrete products plant will be brought to Kalispell and this winter be put in place. Other equipment will be added to make it a modern plant that will be capable of turning out all manner of cement products to be sold throughout the northwest and Idaho.—*Kalispell* (Mont.) *Monitor*.

## To Locate Concrete Pipe Plant in Oklahoma

ESTABLISHMENT of a concrete pipe manufacturing plant at Oklahoma City, Okla., is planned by the Lock Joint Pipe Co., a New Jersey corporation, L. M. Bush, city engineer, said recently.

This company was low bidder on pipe for use in the sanitary sewer to be laid in the old Rock Island right of way, tabulations in the engineering department showed. The bid price of $2.80 a foot for 42-in. pipe was about half what the city formerly paid for material of this kind, Mr. Bush said.

Work will be started on the sewer line as soon as possible in order to provide jobs for idle laborers. Applications will not be received for jobs until further notice.—*Oklahoma City* (Okla.) *Oklahoman*.

## Report County and Local Road Improvements Throughout the Country

A TOTAL of 35,883 miles of county and township roads were surfaced during 1930, according to the Bureau of Public Roads of the U. S. Department of Agriculture. At the end of the year the total mileage of county and local roads surfaced was 467,338.

The total surfaced mileage is composed of the following types: Sand-clay 71,907 miles; surface treated and plain gravel, 310,308; surface treated and plain waterbound macadam, 43,527; bituminous penetration macadam, 19,059; bituminous concrete and sheet asphalt, 6019; portland cement concrete, 14,656; and brick and other block types, 1862.

Counties and other local authorities outside of cities expended a total of approximately $700,000,000 for road purposes divided as follows: Construction $297,000,000, maintenance $284,000,000, miscellaneous $37,000,000 and interest on bonds $82,000,000. The local authorities also expended $113,000,000 for bond retirement and transferred $39,000,000 to the states for state road work.

Comparison of these figures with similar figures for 1929 shows that there was an increase of 6000 miles in the rate of surfacing roads, and that local road expenditures increased by $55,000,000.

These figures do not include work done on state highway systems.

## On Portland Cement Stucco in India

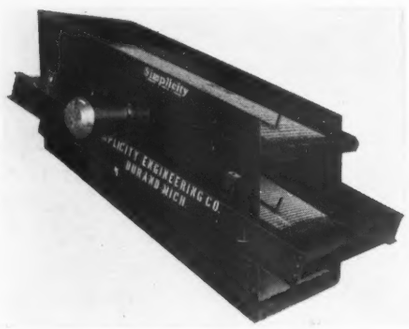
A BOOKLET on portland cement plastering has been issued by the Concrete Association of India. This booklet gives specifications for the application of cement stucco to various types of surfaces and describes methods of getting various textures in the finished surface. These methods are well illustrated.

# New Machinery and Equipment

## Gyrating Screen

A NEW MODEL B "Simplicity" utility gyrating screen is announced by the Simplicity Engineering Co., Durand, Mich. This new model is said to have five new features that improve its operating characteristics.

These features, the manufacturer states,




***Direct drive on this screen***

are (1) the motor is mounted directly on the gyrating shaft, eliminating all couplings, gears, pulleys, belts and guards; (2) complete interchangeability of shaft assemblies in two hours or less; (3) resilient rubber mountings; (4) screen angle can be adjusted in the field; and (5) field adjustment of balance compensator.

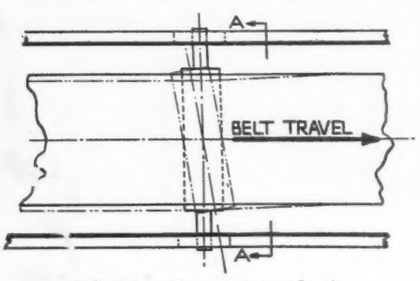
These screens are also available with a flat pulley drive or for V-belt drive. It is said a 5-hp. motor will drive this 4x8-ft. screen at capacity.

●

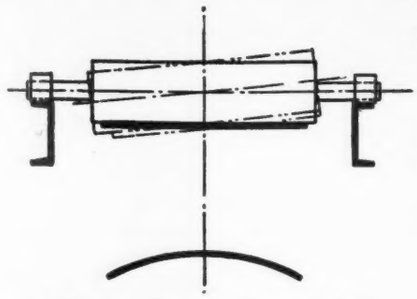
## Belt Adjusting Roller

THE "Belt-Trainer" is announced by the Robins Conveying Belt Co., New York, N. Y. This device can be applied on the return strand of a belt conveyor where the belt is not troughed to keep the belt running straight.

This equipment consists of a tubular roller mounted upon a single anti-friction bearing at its center. The bearing is internally pivoted upon a fixed swivel pin located on




***Substituted at intervals for return idler***



***Adjusts self with changing load***

the center line of the conveyor and inclined forward about 30 deg. When the weight of the belt falls more on one side of the pivot than on the other the roller is said to rock downward on the heavy side. At the same time the roller moves forward on the down-side and backward on the up-side, thus causing the belt to return to center, the manufacturer states.

Under normal conditions it is said successful training of the return strand can be accomplished by substituting one Belt Trainer for every eighth return idler. This device is made for all belt widths from 12 in. to 48 in. It is interchangeable with Robins standard return idlers, and the manufacturer states it may be easily modified to suit any other equipment.

●

## Gasoline-Electric Locomotive

A 50-TON 8-wheel gas-electric locomotive has been produced by the Vulcan Iron Works, Wilkes-Barre, Penn.

The locomotive is powered with two 175 hp. 6-cylinder LeRoi gasoline engines, each direct connected through a flexible coupling to a General Electric direct current 500-volt generator. A General Electric 112-hp. force-ventilated motor is geared to each axle through single reduction gearing. Engines are started through the main generator by current supplied from a 32-volt battery, both engines being connected to a common throttle lever which regulates the speed and pulling power of the locomotive. For light haulage requirements the locomotive can be operated with one engine only, and as more power is required the second engine may be started and cut in without stopping the locomotive for the change, the manufacturer states.

Axles and journals are equipped with Timken roller bearings. The cab and operator's station is equipped for dual control. A Westinghouse straight and automatic air brake is provided. An auxiliary hand wheel brake is also included. It is said the locomotive is built to conform to all safety requirement features of the I. C. C.

The manufacturer states that under dynamometer test this locomotive developed a starting tractive power of upwards of 36,000 lb. and that it is powered for a maximum light running speed of approximately 30 mi. per hr.

Features claimed for this locomotive are high and instant starting power; smooth and rapid acceleration; speed automatically adjusted to the load; ease of operation; fuel economy; low operating and maintenance cost; greater ton mileage; electric power built up as needed; minimum standby losses; mechanical drive gears eliminated.

●

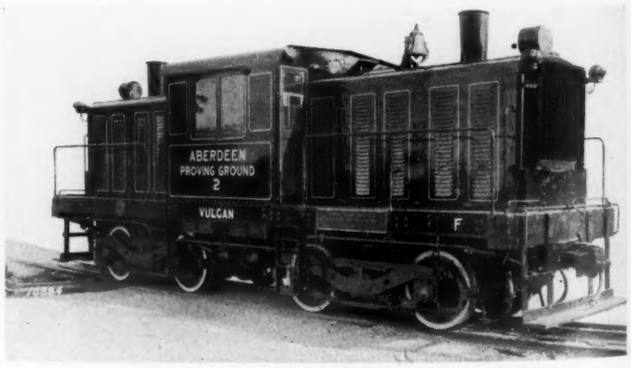
## Disc Feeder

THE "Concenco" disc feeder is announced by the Deister Concentrator Co., Ft. Wayne, Ind.

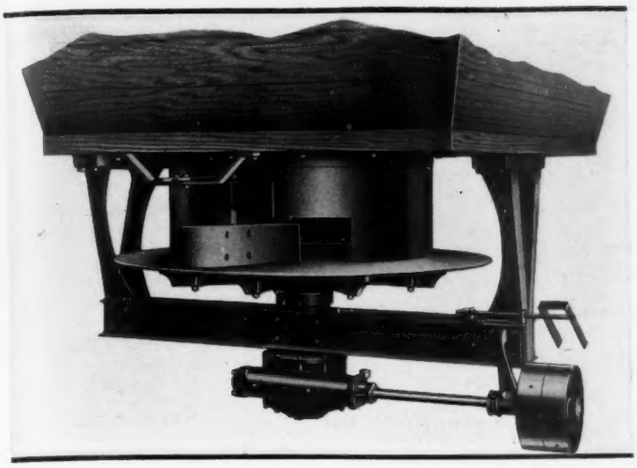
According to the manufacturer, this feeder will accurately feed crushed and ground materials such as sand, ground clay and shale, gravel, crushed rock, coal, etc., up to 3 in. Feeders to handle any desired capacity are available.

The renewable disc of this feeder is a 60-in. steel circle made of heavy plate bolted to a cast-iron spider. The spider is bored and keyed to the vertical shaft.

The control of discharge is by the angle of plow which can be set for any capacity. It is said this can be adjusted to suit any condition while operating. This feeder can be supported on its own foundation or sus-




***Either engine may be started or cut out without stopping***



*Angle of plow controls discharge capacity*

pended from the underside of the bin to suit conditions.

●

## Dog-Leg Drag Scraper Device Announced

A "DOG-LEG" device to enable power drag scrapers to turn a corner along their span and work along two paths at approximately right angles has recently been developed by Sauerman Bros., Inc., Chicago, Ill.

Whereas the customary drag scraper installation consists of a two-drum hoist, two operating cables for inhauling and outhauling the scraper bucket, and two guide-block supports, the "dog-leg" installation consists of a three-drum hoist, three operating cables, and three guide-block supports. The third guide block is supported at the point where the scraper makes its right-angle turn, and the third operating cable is a "center-haul" cable which serves always to pull the bucket toward the turning point (on both the inhaul and the backhaul). This center haul cable passes over a guide-block at the turning point to a rod connecting the front and rear bridles of the scraper, so that it pulls on the front bridle during the inhaul but slides to the back of the bucket to pull on the rear bridle during the backhaul. The regular loadline pulls the loaded scraper from the turning point to the dumping point, and the regular pullback cable returns the empty bucket from the turning point.

Some of the situations said to make an installation of this sort desirable are (1) digging or reclaiming from storage parallel to tracks and turning a corner to mount a carloading incline; (2) in underground mines, loading cars in a corridor at right angles to the working face; and (3) digging lengthwise in trenches and turning to drag the spoil onto the bank. It is also said to be possible to use this device with two tractors, one with a double-drum and the other with a single-drum hoist, instead of the regular three-drum scraper hoist.

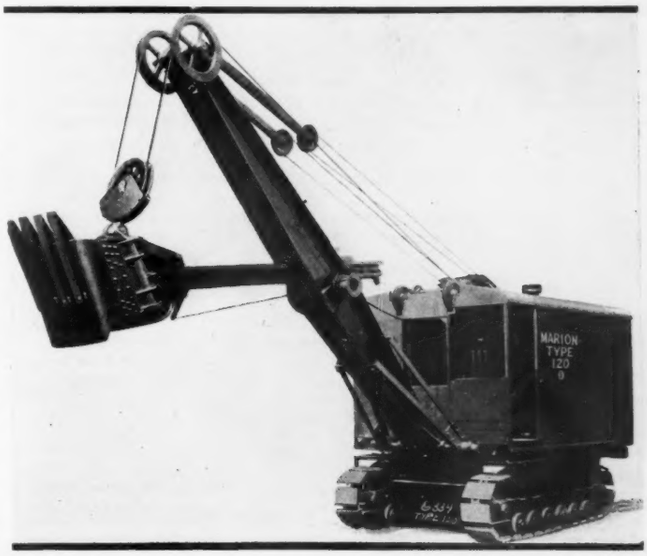
*Dragline scraper with "dog-leg" device, making a right-angle turn*

●

## One-Half Yard Gas Shovel

A NEW ½ cu. yd. gas shovel is announced by the Marion Steam Shovel Co., Marion, Ohio. On this new shovel the boom length is 18 ft. 6 in., the dipper handle length is 11 ft. 10 in., the dumping height 12 ft. 7 in., the dumping radius 22 ft. and the working weight is said to be approximately 42,000 lb.

Features claimed by the manufacturers for this shovel are oversize rotating gear, high ground clearance, centralized machinery mounting, low center of gravity and speed and mobility. This unit, type 120, is convertible as a shovel-dragline-clamshell-crane and all parts are said to be easily accessible.




*High ground clearance with low center of gravity*

●

## Large Capacity Battery

THE Edison Storage Battery Co., Orange, N. J., announces it has added to its list of cells in regular production a new series known as the "C" type and manufactured in five different ampere hour capacities ranging from 337.5 ampere hours to 675 ampere hours.

These cells are said to vary in their manufacture from the "A" type cells only in the fact that each positive and negative plate is approximately 50% higher than the "A" type positive and negative plate.

Not only is the ampere hour capacity of a "C" type cell 50% greater than the corresponding "A" type cell containing the same number of positive plates, but its rated watt hour capacity is also 50% greater, the manufacturer states.

# Current Prices of Ready-Mix Concrete

**AMARILLO, TEX.**—Prices per cu. yd.*

Lime Mortar

| Mix | |
|---|---|
| 1–4 | 6.50 |
| 1–4½ | 6.25 |
| 1–5 | 6.00 |

Terrazzo

| Mix | |
|---|---|
| 1–3 –0 | 9.75 |
| 1–3½–0 | 9.25 |
| 1–4 –0 | 8.75 |
| 1–4½–0 | 8.50 |
| 1–5 –0 | 8.25 |

Topping

| Mix | |
|---|---|
| 1–1 –0 | 14.00 |
| 1–1½–0 | 13.00 |
| 1–2 –0 | 12.00 |
| 1–2½–0 | 11.50 |
| 1–3 –0 | 11.00 |
| 1–3½–0 | 10.50 |

Base—Strength

| | |
|---|---|
| 4000 lb. per sq. in. | 10.00 |
| 3500 lb. per sq. in. | 9.50 |
| 3000 lb. per sq. in. | 9.25 |
| 2500 lb. per sq. in. | 9.00 |
| 2000 lb. per sq. in. | 8.75 |
| 1500 lb. per sq. in. | 8.50 |

Base

| Mix | |
|---|---|
| 1–2 –3½ | 9.50 |
| 1–2¼–4 | 9.25 |
| 1–3½–4½ | 8.25 |
| 1–3 –5 | 8.25 |
| 1–4 –6 | 7.50 |

*For orders of 50 cu. yd. or more, prices are 75c less per cu. yd. than quoted. Free delivery within city limits for 2 cu. yd. or more per load; $1.00 per load extra for less than 2 cu. yd. loads, except to finish a job. Additional charge of 10c per mile per cu. yd. for deliveries outside of city limits.

**BELLINGHAM, WASH.**—Prices per cu. yd.¶

| Mix | Retail, f.o.b. bunkers | In carloads |
|---|---|---|
| 1–3–4 | 6.85 | 6.10 |
| 1–3–5 | 6.51 | 5.75 |
| 1–2–3 | 7.85 | 6.91 |
| 1–2–4 | 7.27 | 6.50 |

¶Additional charges for delivery to various zones. First zone, added charge of 75c per cu. yd.; second zone, added charge of $1.05; third zone, added charge of $1.40; fourth zone, added charge of $1.75.

**BOSTON AND CAMBRIDGE, MASS.**—Base price per cu. yd.‡

| Mix | |
|---|---|
| 1–2– 4 (3 to 30 cu. yd.) | 10.00 |
| 1–2 –4 (30 cu. yd. and over) | 7.75 |
| 1–3 –6 (3 to 30 cu. yd.) | 9.50 |
| 1–3 –6 (30 cu. yd. and over) | 7.25 |
| 1–2½–5 (3 to 30 cu. yd.) | 9.75 |
| 1–2½–5 (30 cu. yd. and over) | 7.50 |
| 1–2 –3 (3 to 30 cu. yd.) | 10.45 |
| 1–2– 3 (30 cu. yd. and over) | 8.20 |
| 1–1½–3 (3 to 30 cu. yd.) | 10.55 |
| 1–1½–3 (30 cu. yd. and over) | 8.30 |
| 1–1–2 (3 to 30 cu. yd.) | 11.30 |
| 1–1–2 (30 cu. yd. and over) | 9.05 |
| 1–2 (3 to 30 cu. yd.) | 13.00 |
| 1–2 (30 cu. yd. and over) | 10.75 |

‡Discount of 50c per cu. yd. allowed on deliveries made between the 1st and 15th of the month if bill is paid on or before the 25th and on deliveries made between 15th and 30th if paid on or before the 10th of following month.

**CHAMPAIGN, ILL.**—Prices per ton†

| Mix | |
|---|---|
| 1–2–3 | 5.25 |
| 1–3–5 | 4.50 |
| 1–2–4 | 4.75 |

†5% trade discount to contractors. Prices to both contractor and consumer subject to cash discount of 5% for payment by 10th of month following delivery.

**COLUMBUS, OHIO**—Delivered prices per cu. yd.

| Mix | Zones§ 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
|---|---|---|---|---|---|---|---|---|---|---|
| 1–1½–3 | 7.05 | 7.25 | 7.45 | 7.65 | 7.85 | 8.05 | 8.25 | 8.45 | 8.65 | 8.85 |
| 1–2 –3 | 6.85 | 7.05 | 7.25 | 7.45 | 7.65 | 7.85 | 8.05 | 8.25 | 8.45 | 8.65 |
| 1–2 –3½ | 6.65 | 6.85 | 7.05 | 7.25 | 7.45 | 7.65 | 7.85 | 8.05 | 8.25 | 8.45 |
| 1–2 –4 | 6.45 | 6.65 | 6.85 | 7.05 | 7.25 | 7.45 | 7.65 | 7.85 | 8.05 | 8.25 |
| 1–2½–4 | 6.35 | 6.55 | 6.75 | 6.95 | 7.15 | 7.35 | 7.55 | 7.75 | 7.95 | 8.15 |
| 1–3 –4 | 6.25 | 6.45 | 6.65 | 6.85 | 7.05 | 7.25 | 7.45 | 7.65 | 7.85 | 8.05 |
| 1–2½–5 | 6.15 | 6.35 | 6.55 | 6.75 | 6.95 | 7.15 | 7.35 | 7.55 | 7.75 | 7.95 |
| 1–3 –5 | 6.05 | 6.25 | 6.45 | 6.65 | 6.85 | 7.05 | 7.25 | 7.45 | 7.65 | 7.85 |
| 1–3 –6 | 5.95 | 6.15 | 6.35 | 6.55 | 6.75 | 6.95 | 7.15 | 7.35 | 7.55 | 7.75 |
| 1–4 –8 | 5.85 | 6.05 | 6.25 | 6.45 | 6.65 | 6.85 | 7.05 | 7.25 | 7.45 | 7.65 |
| 1–2 | 9.55 | 9.75 | 9.95 | 10.15 | 10.35 | 10.55 | 10.75 | 10.95 | 11.15 | 11.35 |
| 1–3 | 7.95 | 8.15 | 8.35 | 8.55 | 8.75 | 8.95 | 9.15 | 9.35 | 9.55 | 9.75 |

§All zones radiating from center of city. Zone 1 is one mile in radius, zone 2 is two miles in radius, zone 3 is three miles in radius, etc. Discount of 25c per cu. yd. allowed for payment 10th of month following delivery date. For orders over 50 cu. yd. a deduction of 25c per cu. yd. is allowed. Orders of less than 2 cu. yd. carry same haul charge as 2 cu. yd. load. Orders for 2 cu. yd. or over delivered in full loads at 2 yd. or more. No extra charge made for finishing load if less than 2 cu. yd.

**FAIRMONT, W. VA.**—Prices per cu. yd. (c)

| Mix | Quantity | Delivered | Called for |
|---|---|---|---|
| 1–2–4 | Less than 1 cu. yd. | 11.00 | 10.00 |
| 1–2–4 | From 1 to 4 cu. yd. | 10.00 | 9.00 |
| 1–2–4 | From 5 to 10 cu. yd. | 9.50 | 8.50 |
| 1–2–4 | From 11 to 49 cu. yd. | 9.00 | 8.00 |
| 1–2–4 | From 50 cu. yd. and up | 8.50 | 7.50 |

(c) For 1–2–3 mix add 50c per cu. yd. to prices quoted; for 1–3–5 mix deduct 50c per cu. yd. from prices quoted.

**HARTFORD, CONN.**—Prices per cu. yd. delivered.

| Mix | |
|---|---|
| 1–2–4 (d) | 6.25 |
| 1–3–5 (d) | 5.90 |
| 1–2–0 finish | 12.00 |

(d) Placing, $1.00 per cu. yd. extra.

**CLEVELAND, OHIO** (a)—Prices per cu. yd. to contractors for orders of 2 cu. yd. or more.

Public Square basing point
Aggregate: Limestone

| Mix | 1st mile | 2nd mile | 3d mile (Maximum) |
|---|---|---|---|
| 1–1 –2 | 7.50 | 7.75 | 8.00 |
| 1–2 –3 | 6.30 | 6.55 | 6.80 |
| 1–2 –4 | 6.00 | 6.25 | 6.50 |
| 1–2½–3½ | 6.00 | 6.25 | 6.50 |
| 1–2½–4 | 5.80 | 6.05 | 6.30 |
| 1–3 –4 | 5.70 | 5.95 | 6.20 |
| 1–2½–5 | 5.60 | 5.85 | 6.10 |
| 1–3 –5 | 5.50 | 5.75 | 6.00 |
| 1–3 –6 | 5.40 | 5.65 | 5.90 |
| 1–4 –8 | 5.25 | 5.50 | 5.75 |
| 1–2 Finish | 7.50 | 7.75 | 8.00 |
| 1–2½ Finish | 7.00 | 7.25 | 7.50 |
| 1–3 Finish | 6.50 | 6.75 | 7.00 |

Basing point: Windfall Road and Broadway, Bedford, Ohio
Aggregate: Bedford gravel

| Mix | Miles 1st | 2nd | 3rd | 4th | 5th | 6th | 7th* |
|---|---|---|---|---|---|---|---|
| 1–1 –2 | 6.50 | 6.75 | 7.00 | 7.25 | 7.50 | 7.75 | 8.00 |
| 1–2 –3 | 5.30 | 5.55 | 5.80 | 6.05 | 6.30 | 6.55 | 6.80 |
| 1–2 –4 | 5.00 | 5.25 | 5.50 | 5.75 | 6.00 | 6.25 | 6.50 |
| 1–2½–3½ | 5.00 | 5.25 | 5.50 | 5.75 | 6.00 | 6.25 | 6.50 |
| 1–2½–4 | 4.80 | 5.05 | 5.30 | 5.55 | 5.80 | 6.05 | 6.30 |
| 1–3 –4 | 4.70 | 4.95 | 5.20 | 5.45 | 5.70 | 5.95 | 6.20 |
| 1–2½–5 | 4.60 | 4.85 | 5.10 | 5.35 | 5.60 | 5.85 | 6.10 |
| 1–3 –5 | 4.50 | 4.75 | 5.00 | 5.25 | 5.50 | 5.75 | 6.00 |
| 1–3 –6 | 4.40 | 4.65 | 4.90 | 5.15 | 5.40 | 5.65 | 5.90 |
| 1–4 –8 | 4.25 | 4.50 | 4.75 | 5.00 | 5.25 | 5.50 | 5.75 |
| 1–2 Finish | 7.00 | 7.25 | 7.50 | 7.75 | 8.00* | ..... | ..... |
| 1–2½ Finish | 6.50 | 6.75 | 7.00 | 7.25 | 7.50* | ..... | ..... |
| 1–3 Finish | 6.00 | 6.25 | 6.50 | 6.75 | 7.00* | ..... | ..... |

*Maximum.

(a) Industrials or consumers 50c more than contractors. Extra charge for concrete delivered nights, Sundays or holidays, $1.00 per cu. yd. over daytime schedule. For high-early-strength or waterproofing cements additional charge of $2.00 per cu. yd. For waterproof concrete using Anti-Hydro with manufacturer's guarantee, additional charge of $2.00 per cu. yd. For orders less than 2 cu. yd. add $1.00 per yd. to above prices. Prices quoted are based upon normal discharge of load within 20 minutes after arrival of truck. A demurrage charge of $1.00 for each 15 minutes thereafter.

**DES MOINES, IOWA**—Prices per cu. yd. (b)

(Made with ¾-in. gravel for structural work)

| Mix | Slump | Plant price | Zone A | B | C | D |
|---|---|---|---|---|---|---|
| 1–2½–5 | 2-in. | 6.00 | 6.50 | 6.75 | 7.00 | 7.25 |
| 1–2½–5 | 6 in. | 6.25 | 6.75 | 7.00 | 7.25 | 7.50 |
| 1–2 –4 | 2 in. | 6.50 | 7.00 | 7.25 | 7.50 | 7.75 |
| 1–2 –4 | 6 in. | 6.75 | 7.25 | 7.50 | 7.75 | 8.00 |
| 1–2 –3½ | 2 in. | 7.00 | 7.50 | 7.75 | 8.00 | 8.25 |
| 1–2 –3½ | 6 in. | 7.25 | 7.75 | 8.00 | 8.25 | 8.50 |
| 1–2½–3 | 2 in. | 7.50 | 8.00 | 8.25 | 8.50 | 8.75 |
| 1–2½–3 | 6 in. | 7.75 | 8.25 | 8.50 | 8.75 | 9.00 |

(Made with pea gravel for cellar and sidewalks)

| Mix | Slump | Plant price | Zone A | B | C | D |
|---|---|---|---|---|---|---|
| 1–2½–5 | 2 in. | 5.75 | 6.25 | 6.50 | 6.75 | 7.00 |
| 1–2½–5 | 6 in. | 6.00 | 6.50 | 6.75 | 7.00 | 7.25 |
| 1–2 –4 | 2 in. | 6.25 | 6.75 | 7.00 | 7.25 | 7.50 |
| 1–2 –4 | 6 in. | 6.50 | 7.00 | 7.25 | 7.50 | 7.75 |
| 1–2 –3½ | 2 in. | 6.75 | 7.25 | 7.50 | 7.75 | 8.00 |
| 1–2 –3½ | 6 in. | 7.00 | 7.50 | 7.75 | 8.00 | 8.25 |
| 1–2½–3 | 2 in. | 7.25 | 7.75 | 8.00 | 8.25 | 8.50 |
| 1–2½–3 | 6 in. | 7.50 | 8.00 | 8.25 | 8.50 | 8.75 |

(b) Discount of 50c per cu. yd. allowed on deliveries made between the 1st and 15th of the month if bill is paid before the 25th and on deliveries made between 16th and 30th if paid before the 10th of following month. Quick setting $2.00 per cu. yd. extra; waterproofing, $2.00 per cu. yd. extra. Each zone approximately one mile.

**DALLAS, TEX.**†

| Strength | Slump ½ in. to 1 in. | 3 in. to 4 in. | 6 in. to 7 in. | Strength | Slump ½ in. to 1 in. | 3 in. to 4 in. | 6 in. to 7 in. |
|---|---|---|---|---|---|---|---|
| 1500 | 5.70 | 5.90 | 6.30 | 2500 | 6.25 | 6.45 | 6.85 |
| 2000 | 6.00 | 6.10 | 6.50 | 3000 | 6.60 | 5.80 | 7.20 |

Fixed Mixes (any slump)

| | | | | | |
|---|---|---|---|---|---|
| 1–2½–5 | 6.90 | 1–2–4 | 7.20 | 1–1½–3 | 7.90 |

†Prices subject to 2% 15 days and are based on quantities of 50 to 999 cu. yd. and on delivery in 2½-cu. yd. loads within Zone 1, which extends about 1½ miles from either of two plants. Zone charges are approximately 10c per cu. yd. per mile beyond the Zone 1 limit. On quantities under 50 cu. yd. add 20c and on quantities over 1000 cu. yd. deduct 30c.

**MEMPHIS, TENN.**—Prices per cu. yd. delivered in city.†

| Strength | Portland | "Incor" | Strength | Portland | "Incor" |
|---|---|---|---|---|---|
| 1800 lb. | 6.50 | 7.30 | 3000 lb. | 8.00 | 9.25 |
| 2000 lb. | 7.00 | 8.00 | 3500 lb. | 8.60 | 10.00 |
| 2500 lb. | 7.50 | 8.50 | 4000 lb. | 9.80 | 11.75 |

†Above prices based on gravel for aggregate. If stone is wanted for aggregate, additional charge of $1.00 per cu. yd. is made to above prices. 5% cash discount for payment 10th of month following date of invoice.

**INDIANAPOLIS, IND.**—Prices per cu. yd. in small quantities, for delivery within 3-mile haul.

| Mix | |
|---|---|
| 1 bbl. cement/cu. yd. concrete | 5.50 |
| 1¼ bbl. cement/cu. yd. concrete | 6.00 |
| 1½ bbl. cement/cu. yd. concrete | 6.50 |

**LOS ANGELES, CALIF.**¶—Prices per cu. yd.

| Mix | 1–5 yd. | 5–25 yd. | 25 or more | Mix | 1–5 yd. | 5–25 yd. | 25 or more |
|---|---|---|---|---|---|---|---|
| 3–50–50 | 8.25 | 7.25 | 6.25 | 1–2¾–3½ | 10.00 | 9.00 | 8.00 |
| 4–50–50 | 8.85 | 7.85 | 6.85 | 1–2 –4 | 9.85 | 8.85 | 7.85 |
| 1–3 –6 | 8.95 | 7.95 | 6.95 | 1–2½–3½ | 10.10 | 9.10 | 8.10 |
| 1–3 –5 | 8.95 | 7.95 | 6.95 | 1–2½–3¼ | 10.05 | 9.05 | 8.05 |
| 1–2½–5 | 9.50 | 8.50 | 7.50 | 1–2 –3 | 10.60 | 9.60 | 8.60 |
| 1–3 –4 | 9.75 | 8.75 | 7.75 | 1–2 –3½ | 10.20 | 9.20 | 8.20 |

¶Above prices for deliveries in Zone 1 (1-5 miles). Added charge of 75c per cu. yd. for deliveries in Zone 2 (5 to 10 miles). Added charge of $1.50 for Zone 3 (10 to 15 miles). Discount of 50c per cu. yd. if payment is made within 10 days from delivery.

**MILWAUKEE, WIS.**—Prices per cu. yd. (e)

| 28-day breaking strength: | Per sq. in. | Slump 2 to 4 in. | Slump 4 to 6 in. | Slump 6 to 8 in. |
|---|---|---|---|---|
| Garage footings and walls | 2000 lb. | 7.00 | 7.40 | 7.80 |
| Footings, floors, walls | 3000 lb. | 7.50 | 7.90 | 8.30 |
| City paving | 3300 lb. | 7.75 | 8.00 | 8.40 |
| Sidewalks, curbs | 4000 lb. | 8.25 | 8.75 | 9.25 |
| 24-hour high early strength | 5000 lb. | 10.00 | 10.50 | 11.00 |

Sold on old mixture method, 2- to 4-in. slump; 4- to 6-in. slump; 6- to 8-in. slump.

| | Mix | |
|---|---|---|
| Walls—Garage footing | 1–3–5 | 7.00 |
| City paving | 1–2–4 | 7.50 |
| Garage floors, walls | 1–3–3 | 7.50 |
| Sidewalk | 1–2–3 | 8.00 |
| Special strength (machine bases) | 1–1½–2½ | 9.50 |
| Facing | 1–3 | 10.50 |
| Facing | 1–2 | 12.00 |

(e) Discount of 25c per cu. yd. if paid by 10th of following month.

**MONTGOMERY, ALA.**—Prices per cu. yd. delivered in city limits. (g)

| Mix | | Mix | |
|---|---|---|---|
| 1–2 –4 | 6.25 | 1–3–6 | 5.60 |
| 1–2½–5 | 5.85 | 1–2 mortar topping | 11.00 |

(g) Discount of 25c per cu. yd. for payment in 30 days. Special quotations for quantity orders.

**MORGANTOWN, W. VA.**—Prices for jobs of 1 to 10 cu. yd., delivered (f)

| Mix | | Mix | |
|---|---|---|---|
| 1–2–3 | 9.50 | 1–2½–4 | 8.90 |
| 1–2–4 | 9.00 | 1–2½–5 | 8.50 |

(f) Prices subject to cash discount of 25c per cu. yd. for payment 15 days from date of invoice.

**NEW ORLEANS, LA.** (h)—Plant prices per cu. yd. for 30 yd. or less.

| Mix | Cement Portland | Cement "Incor" | Mix | Cement Portland | Cement "Incor" |
|---|---|---|---|---|---|
| 1–4 –8 | 5.15 | 6.10 | 1–2–2 | 7.70 | 10.25 |
| 1–3 –6 | 5.75 | 7.00 | 2–3–6 | 8.05 | 10.55 |
| 1–3 –5 | 5.95 | 7.35 | 2–3–3 | 8.85 | 12.00 |
| 1–2½–5 | 6.25 | 7.80 | 1–1½ topping | 10.95 | 15.80 |
| 1–2½–4 | 6.40 | 8.15 | 1–2 topping | 9.30 | 13.25 |
| 1–2 –4 | 6.75 | 8.60 | 1–3 topping | 7.85 | 10.85 |
| 1–2 –3 | 7.20 | 9.40 | | | |

Plant prices per cu. yd., 30 cu. yd. or over:

| Mix | Cement Portland | Cement "Incor" | Mix | Cement Portland | Cement "Incor" |
|---|---|---|---|---|---|
| 1–4 –8 | 4.65 | 5.45 | 1–2–2 | 6.95 | 9.15 |
| 1–3 –6 | 5.15 | 6.25 | 2–3–6 | 7.25 | 9.45 |
| 1–3 –5 | 5.35 | 6.55 | 2–3–3 | 8.00 | 10.70 |
| 1–2½–5 | 5.65 | 7.00 | 1–½ topping | 9.85 | 14.10 |
| 1–2½–4 | 5.80 | 7.25 | 1–2 topping | 8.40 | 11.80 |
| 1–2 –4 | 6.05 | 7.70 | 1–3 topping | 7.05 | 9.60 |
| 1–2 –3 | 6.50 | 8.40 | | | |

(h) All prices subject to 5% 15 days, 30 days net. Haulage based on various zones.

**NEWARK AND HARRISON, N. J.**§

| | | | |
|---|---|---|---|
| 1–2 –4 | 7.50 | 1–3 –6 | 6.75 |
| 1–3 –5 | 7.00 | 1–2½–5 | 6.85 |

§Discount of 2% if paid by 10th of month following delivery.

**NEW YORK CITY, N. Y.**‡—Prices per cu. yd.

| Manhattan and Bronx Mix | | Queens Mix | |
|---|---|---|---|
| 1–1½–3 | 10.00 | 1–1½–3 | 8.75 |
| 1–2 –4 | 9.25 | 1–2 –4 | 8.25 |
| 1–2½–5 | 8.75 | 1–2½–5 | 8.00 |
| 1–3 –6 | 8.25 | 1–3 –6 | 7.75 |

Westchester County (within radius of 7 miles)

| | | | |
|---|---|---|---|
| 1–1½–3 | 9.25 | 1–2½–5 | 8.00 |
| 1–2 –4 | 8.50 | 1–3 –6 | 7.50 |

Brooklyn

| Mix | Under 50 cu. yd. | Over 50 cu. yd. |
|---|---|---|
| 1–1½–3 | 9.75 | 8.75 |
| 1–2 –4 | 9.50 | 8.25 |
| 1–2½–5 | 9.25 | 8.00 |
| 1–3 –6 | 9.00 | 7.75 |

‡Special designed mixes on the strength basis priced according to the strength desired. Average price for 2000-lb. concrete in the Borough of Manhattan, $9.00 per cu. yd.

**OMAHA, NEB.***—Prices per cu. yd. for quantities from 1 to 300 yd., delivered anywhere within the city.

| 28-day strength | | 28-day strength | |
|---|---|---|---|
| No. 1. 3500 lb. sq. in. | 7.35 | No. 3. 2500 lb. sq. in. | 6.95 |
| No. 2. 3000 lb. sq. in. | 7.15 | No. 4. 2000 lb. sq. in. | 6.75 |

Transit-Mix Concrete

| 28-day strength | | 28-day strength | |
|---|---|---|---|
| No. 1. 3600 lb. sq. in. | 7.50 | No. 3. 2600 lb. sq. in. | 7.10 |
| No. 2. 3100 lb. sq. in. | 7.30 | No. 4. 2100 lb. sq. in. | 6.90 |

*Sand-gravel mix used as aggregate. No. 1, 6 sacks cement per cu. yd. concrete; No. 2, 5½ sacks cement; No. 3, 5 sacks cement; No. 4, 4½ sacks cement. For high-early-strength concrete using "Quikard" or other supercement, add $2.50 per cu. yd.

**PITTSBURGH, PENN.**—Range of prices, according to zone, for ready-mixed concrete. Prices per cu. yd. delivered, up to 200 cu. yd. (j)

| Mix | Strength | |
|---|---|---|
| 1–1½–2½ | 4000 lb. | 8.60– 9.70 |
| 1–2 –3 | 3500 lb.+ | 8.25– 9.35 |
| Class A | 3500 lb. | 8.10– 9.30 |
| 1–2½–3½ | 3000 lb.+ | 8.00– 9.20 |
| 1–2 –4 Class B | 3000 lb. | 7.90– 9.10 |
| 1–2½–4½ | 2500 lb.+ | 7.75– 8.95 |
| 1–2½–5 | 2500 lb. | 7.60– 8.80 |
| 1–3 –5 | 2000 lb. | 7.50– 8.70 |
| 1–3 –6 | 1500 lb. | 7.40– 8.55 |

Prices per cu. yd. delivered, over 200 cu. yd. (j)

| Mix | Strength | |
|---|---|---|
| 1–1½–2½ | 4000 lb. | 7.60– 9.45 |
| 1–2 –3 | 3500 lb.+ | 7.25– 9.10 |
| Class A | 3500 lb. | 7.10– 8.95 |
| 1–2½–3½ | 3000 lb.+ | 7.00– 8.85 |
| 1–2 –4 Class B | 3000 lb. | 6.90– 8.75 |
| 1–2½–4½ | 2500 lb.+ | 6.75– 8.60 |
| 1–2½–5 | 2500 lb. | 6.60– 8.45 |
| 1–3 –5 | 2000 lb. | 6.50– 8.35 |
| 1–3 –6 | 1500 lb. | 6.40– 8.20 |

(j) Class A concrete is a special concrete prepared for the city of Pittsburgh. Plus indicates the strength shown is the minimum strength. Dealer's commission of 50c per cu. yd. allowed in all zones with exception of Yellow Zone. No commission allowed over 200 cu. yd. Prices subject to cash discount of 25c per cu. yd. for payment 15 days from date of invoice.

**PUEBLO, COLO.**—Prices per cu. yd.‖

| Strength | Zone 1 | Zone 2 | Zone 3 | Strength | Zone 1 | Zone 2 | Zone 3 |
|---|---|---|---|---|---|---|---|
| 3000 lb. | 8.00 | 8.40 | 8.80 | 2100 lb. | 7.10 | 7.50 | 7.90 |
| 2700 lb. | 7.75 | 8.15 | 8.55 | 1500 lb. | 6.50 | 6.90 | 7.30 |
| 2400 lb. | 7.50 | 7.90 | 8.30 | 1200 lb. | 6.50 | 6.90 | 7.30 |

‖On larger quantities to contractors, deduct 50c per cu. yd.

**ROCHESTER, N. Y.**—Prices per cu. yd.

| Mix | Plant price | Prices for delivery to various zones: Zone 1 | 2 | 3 | 4 | 5 | 6 | 7 |
|---|---|---|---|---|---|---|---|---|
| 1–2 –3 | 7.00 | 7.75 | 7.90 | 8.05 | 8.20 | 8.35 | 8.50 | 8.65 |
| 1–2½–3½ | 6.55 | 7.30 | 7.45 | 7.60 | 7.75 | 7.90 | 8.05 | 8.20 |
| 1–3 –4½ | 6.20 | 6.95 | 7.10 | 7.25 | 7.40 | 7.55 | 7.70 | 7.85 |
| 1–4 –5 | 6.00 | 6.75 | 6.90 | 7.05 | 7.20 | 7.35 | 7.50 | 7.65 |
| 1–5 –6 | 5.65 | 6.40 | 6.55 | 6.70 | 6.85 | 7.00 | 7.15 | 7.30 |

**ST. PAUL, MINN.**—Prices per cu. yd. delivered within three miles of plant. (m)

| | | | |
|---|---|---|---|
| 1–2–4 mix | 6.75 | 1–3–5 mix | 6.30 |

(m) For greater distances of haul, increase of 10c per cu. yd. per mile.

**SAN ANTONIO, TEX.**—Prices per cu. yd. on city deliveries.‡

| Mix | | Mix | |
|---|---|---|---|
| 1–3–5 | 7.00 | 1–2–4 | 7.50 |

‡Deduction of 50c per cu. yd. on large orders for delivery one mile of plant.

**SAN JOSE, CALIF.**—Prices per cu. yd. delivered within one mile of plant. (k)

| Mix | Up to 5 cu.yd. | Over 5 cu.yd. | Mix | Up to 5 cu.yd. | Over 5 cu.yd. |
|---|---|---|---|---|---|
| 1–6 | 9.00 | 8.50 | 1– 9 | 8.00 | 7.50 |
| 1–7 | 8.50 | 8.00 | 1–12 | 7.00 | 6.50 |

(k) For deliveries outside of this area add 30c per cu. yd. per mile. Cash discount of 50c per cu. yd. if paid in full by 10th day of following month.

**SANTA CRUZ, CALIF.**—Price per cu. yd. delivered within two-mile radius of plant. (l)

| Mix | Over 5 cu.yd. | Less than 5 cu.yd. | Mix | Over 5 cu.yd. | Less than 5 cu.yd. |
|---|---|---|---|---|---|
| 1–6 | 9.00 | 9.50 | 1–8 | 8.10 | 8.60 |
| 1–7 | 8.50 | 9.00 | 1–9 | 7.90 | 8.40 |

(l) For deliveries outside of this area add 30c per cu. yd. per mile. Cash discount of 50c per cu. yd. if paid in full by 10th day of following month.

**SPRINGFIELD, ILL.**—Prices per cu. yd.

| Mix | | Mix | |
|---|---|---|---|
| 1–3 –6 | 9.00 | 1–2 –3½ | 10.00 |
| 1–3 –5 | 9.20 | 1–2 –3 | 10.20 |
| 1–2½–4 | 9.45 | 1–1½–3 | 10.55 |
| 1–2 –4 | 9.75 | 1–1 –2 | 11.25 |

**WILKES-BARRE, PENN.**—Prices per cu. yd. delivered within one mile of plant, subject to discount of 25c per cu. yd. for payment within 10 days from date of delivery. Extra charge of 15c per cu. yd. for each additional mile.

| Mix | Gravel | Stone | Mix | Gravel | Stone |
|---|---|---|---|---|---|
| 1–2 –3 | 7.60 | 7.90 | 1–3–5 | 6.75 | 7.05 |
| 1–2 –4 | 7.30 | 7.60 | 1–3–6 | 6.75 | 7.05 |
| 1–2½–5 | 7.00 | 7.30 | | | |

# News of All the Industry

## Incorporations

**Jones County Gravel Co.**, Abilene, Tex., $20,000. Henry Sayles, Jr., E. B. Sayles and C. M. Sayles.

**Superior Kaolin Co., Inc.**, Baltimore, Md. F. Fulton Bramble, 901 Continental Bldg., Baltimore.

**Gibraltar Cement Products Corp.**, Hackensack, N. J., $125,000. Charles Turndorf, Hackensack, N. J.

**Quimby Interlocking Cast Stone Co.**, Houston, Tex. C. F. Fleming, 7121 Harrisburg Blvd., Houston, Tex.

**Tennessee Valley Sand and Gravel Co.**, Shellmound, Tenn., $25,000. L. E. Wilson, W. M. Thompson and Claude Smith, Jr.

**Nebraska Gravel and Stone Co.**, Omaha, Neb., $25,000. Emil E. Placek, Carl Manska and Joseph T. Votava.

**Frank F. Kucera Co.**, 4820-28 W. 25th Pl., Cicero, Ill., $50,000. Frank F. Kucera, Josephine Adams and James Knott. To deal in gravel, stone, coal, etc.

**Akron Concrete Products Corp.**, Akron, Ohio, 500 shares preferred stock at $100 each and 2500 shares common no par stock. Lewis E. Bratt, Robert S. Mills and Charles H. Blackmore, Akron.

**Sequoyah Marble Corp.**, Fort Smith, Ark. Charles E. Jenks and James W. Hicks, both of Carthage, Mo. To develop marble and stone quarries in western and northwestern Arkansas.

**Oak Hill Lime and Stone Co.**, State College, Penn., $5000. H. O. Smith. To engage in mining, quarrying and processing stone and lime production.

## Quarries

**Southern Lime Products Co.**, Cordele, Ga., has been operating at capacity since the remodeling of its plant this year. New equipment was added.

**Hoffman Bros.**, Harrisburg, Penn., have reduced the price on an accumulation of ¾-in. limestone in order to reduce this stock before winter.

**Yoch and Roberts**, Norristown, Penn., recently had its crushed stone operation and the products it supplies described in the *Norristown Register*.

**Georgia Stone and Cement Co.**, Portland, Ga., has appointed R. J. Rundle as superintendent. He succeeds E. J. Olson.

**Isaac Griffith**, Ashtabula, Ohio, is now owner of the old stone quarry site near Windsor. This quarry was operated 40 years ago.

**Pete Enders** is enlarging his crew of workmen at the limestone quarry in Greybull, Wyo., to prepare limestone for the manufacturing season of local beet sugar plants.

**Armbrust quarry** and **Hyer quarry**, Washington Court House, Ohio, have operated at capacity during the past season. Most of their production has been used in road construction.

**Mizner Industries, Inc.**, Palm Beach, Fla., has completed plans for opening a second limestone quarry near Ellenton, Fla. Quarrying equipment is to be installed at once.

**Florida Trap Rock Products Co.**, Zephyrhills, Fla., plans to erect a plant near there for producing crushed rock. It is reported that equipment has been ordered.

**L. D. Hartog** has been appointed to supervise operation of the rock crusher operated by the county board near Oskaloosa, Ia. Equipment is being transferred to the Ella Helm farm.

**Travertine Quarries, Inc.**, Sarasota, Fla., has purchased 52½ acres near Manatee and is clearing the property. Orders are said to have been received for several carloads of unfinished blocks.

**Los Angeles, Calif.** A petition objecting to the establishment of a rock crushing plant at an abandoned quarry west of Remsen street has been filed with the city council. The petition was referred by the council to its city planning committee.

**Independence, Mo.** The county court here is planning to build barracks and quarters for short term prisoners who will operate its new rock crusher. Engineers have reported 100,000 cu. yd. of good rock at the operation.

**M. F. Dollard, Jr.**, Albany, N. Y., has indicated his intention to obtain rock for any additional road work which may be carried on from the McGurk farms where an old granite quarry is available.

**Whitehouse Stone Co.**, Toledo, Ohio, recently was described in the *Toledo* (Ohio) *Bee*. A picture of its plant at Whitehouse and a description of the operation and uses of its products were given.

**New Port Richey Rock Co.**, New Port Richey, Fla., will probably erect a new travertine, assorted marble and lime rock products plant there. Ralph Werner is president. The equipment to be installed is reported to depend on receipt of contracts.

**W. E. Shaw**, Delaware, Ohio, and **C. S. Munday**, Sanbury, have purchased the interests of the A. B. Shaw quarries eight miles north of Worthington. The quarry is equipped and will produce crushed stone, agricultural limestone, and will handle washed sand and gravel.

**Lockport, Ill.** A new stone quarry for the old state prison has been opened in the southern edge of Lockport township. Equipment has been received, including a stone crusher, and the quarry will soon be ready for operations. The stone provided may be obtained free by the various townships willing to pay the cost of transportation.

## Sand and Gravel

**New Richmond, Wis.**, has purchased a ½-acre gravel deposit to supply its street requirements.

**Urbana Sand and Gravel Co.**, Livingston, Tex., had an informal opening of its new office and display room recently.

**Sound Gravel Co., Inc.**, Brooklyn, N. Y., has filed a schedule in bankruptcy listing liabilities as $161,197 and assets as $141,163.

**Mundt-Lyons, Agar, S. D.**, found a mastodon tooth while excavating gravel at its pit recently. The tooth was 3 in. wide and 6 in. deep.

**Drewing gravel plant**, Tippecanoe, Ohio, escaped a serious accident at its plant when the 72-ft. boom broke recently. The boom dropped to the loading point and just missed a trucker.

**Pontiac, Mich.** Arrangements have been made for the village to take gravel from the Bloomfield township gravel pit without cost to the township. A memorandum charge will be made against the village without cash payment by it.

**Jefferson City, Mo.** Missouri Pacific railroad recently filed suit to determine right and title to the land on which the Jefferson City sand plant operates. It is said that if the railroad wins the suit it will in turn lease the property to the sand plant.

**Crystal Springs Sand and Gravel Co.**, Crystal Springs, Miss., has filed articles of incorporation. Its operation will be managed by Mr. Traxler. Contracts have been drawn up with the Illinois Central railroad and construction of a spur track to the new plant will begin soon.

**Steilacoom Sand and Gravel Co.**, Tacoma, Wash., recently won its suit against Pierce county for a restoration of the 1930 assessed valuation on its holdings to the 1929 figure. In January of this year the company sold its holdings to the Nisqually Land Co.

**Pauls Valley, Okla.** The survey and acceptance of the gravel pit recently purchased by the chamber of commerce and county commissioners makes available immediately gravel for street improvement. Citizens who wish to surface streets adjacent their property may get the gravel free but must pay for the hauling.

## Cement

**Riverside Portland Cement Co.**, Los Angeles, Calif., expected to reopen its Riverside plant October 1.

**Volunteer Portland Cement Co.**, Knoxville, Tenn., reports that it is operating near capacity, producing some 2700 bbl. per day.

**Marquette Cement Manufacturing Co.**, Chicago, Ill., reports that 300,000 bbl. of cement have been moved by barge from its La Salle plant to the St. Louis territory the past season.

**Oregon Portland Cement Co.'s** plant at Lime, Ore., is facing a water shortage. It is reported the cement company is finding its activities greatly hampered by an insufficient supply of water.

**Florida Portland Cement Co.**, Chicago, Ill., will resume operations at its Tampa, Fla., plant soon. officers of the company said recently. Two shipments were to be made late in September for foreign ports, it is reported.

**Colorado Portland Cement Co.**, Denver, Colo., announced through R. J. Morse, vice-president and general manager, that its plant at Portland would start operation October 1. At the same time it closed the Boettcher plant.

**Southwestern Portland Cement Co.**, Los Angeles, Calif., is defendant in the case of M. H. Johnson, employe, who received an injury in April, 1929, while working at its plant in Osborn, Ohio. At a recent hearing no definite decision was made because of insufficient evidence.

**Dewey Portland Cement Co.'s** plant at Dewey, Okla., will open 60 days ahead of the expected opening date as a result of an order for 60,000 bbl. of cement from the Oklahoma state highway commission, D. M. Tyler, vice-president of the company, has said.

**Lone Star Cement Co.**, Houston, Tex., reports an order of 50,000 bbl. of cement placed by the Panama railway. The first shipment will be made in the latter part of October and is reported as the first shipment of cement from the port of Houston for the Panama Canal area.

**International Cement Corp.**, New York, N. Y., features paving of the Boston Post Road through the business district of Larchmont, N. Y., with Incor cement in a recent issue of the *Incor News*. Statements by local organizations and merchants tell of benefits from early opening of this project.

**Medusa Portland Cement Co.**, Cleveland, Ohio, has reprinted an editorial, "Rise and Walk," by Herbert N. Casson, on the opportunities in American business today. The substance of this was published in ROCK PRODUCTS, May 9, 1931. The reprint has been given distribution to its customers.

**Olympic Portland Cement Co.**, Bellingham, Wash., had a meeting of its safety committee at the Bellingham Hotel recently. Superintendent Krabbe congratulated the committeemen present and commended the company's workmen for their interest in safety work. The meeting was held to impress upon them the desirability of continuing the safety work without accidents during the remainder of the year.

## Gypsum

**Standard Gypsum Co.**, Seattle, Wash., received a shipment of gypsum from San Marcos island recently. In a heavy storm which the ship encountered en route, M. Auten, boatswain of the steamer, was swept overboard and lost.

**United States Gypsum Co.** was among the exhibitors at the chamber of commerce industrial exhibit of Staten Island manufactured products recently held at the Paramount Theater, Staten Island. An interesting story of the U. S. Gypsum Co.'s operation at its New Brighton plant was given in the *Staten Island Advance*.

## Lime

**Erin Lime Plant**, Erin, Tenn., is expected to resume operations soon.

## Miscellaneous Rock Products

**Tar Heel Mica Co.**, Plumtree, N. C., resumed operations recently. David T. Vance is president of the company.

**Consolidated Feldspar Co.** will soon have its new mill near Kingman, Ariz., ready for operation, Superintendent Welsh reports.

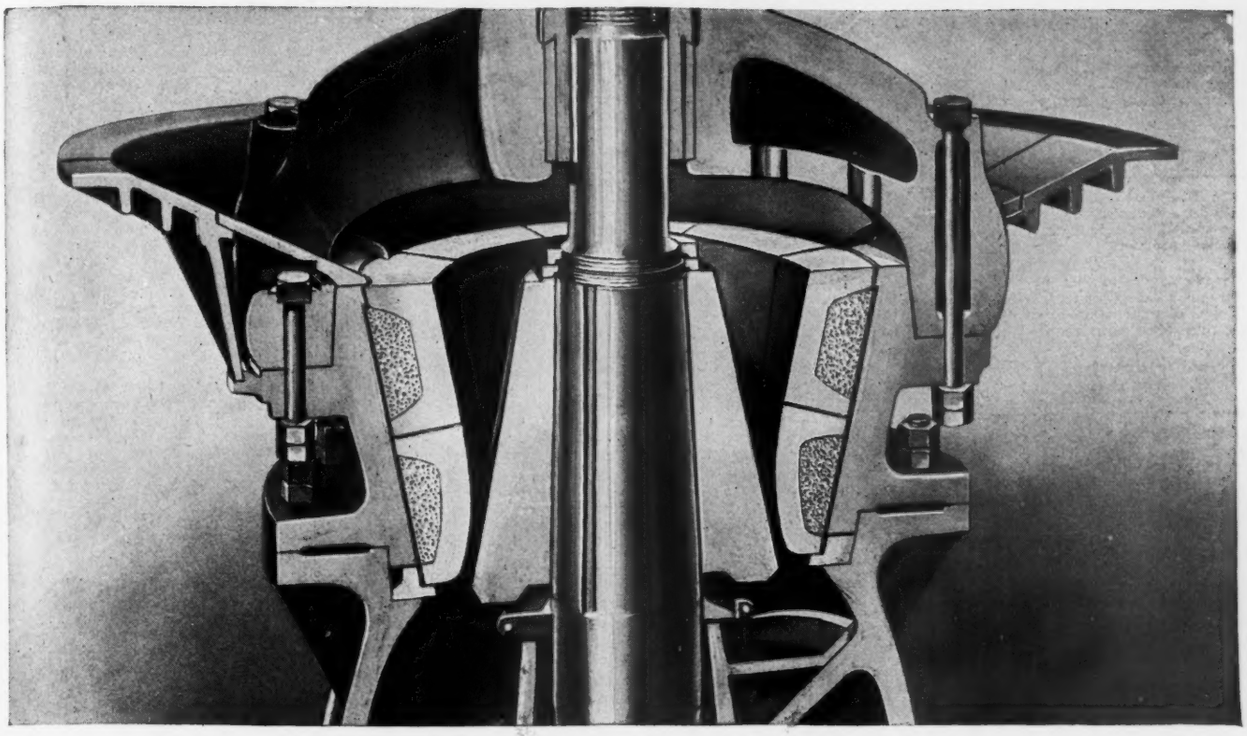
**Northwest Magnesite Co.**, Chewelah, Wash., has closed its magnesite plant temporarily. The Thermax plant is still in operation.

**Coen Companies, Inc.**, Los Angeles, Calif., is reported to be installing additional crushing and grinding equipment at its plant in Gonzales, Tex., to develop a daily capacity of 100 tons of kaolin.

**Farm Aid Limestone Co.**, Huntington, Ind., has moved from temporary quarters to the Winebrenner elevator. Its product is used in the manufacture of stock mineral feeds.

**Lutcher and Moore Lumber Co.**, Orange, Tex., is reported as leased to the Texas Gulf Sulphur Co. The land will be explored for sulphur. Texas Gulf Sulphur Co. reports it is not developing sulphur deposits at Lake Charles, La.

**George S. Nalle**, Austin, Tex., **J. R. Key**, Lampasas, and associates are reported as interested in



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**The principal advantages of the new concaves are: approximately 50% greater capacities at close settings; possibility of "choking" and "stalling" greatly reduced; present minimum settings may be decreased from 25%-35% without reducing eccentric throw; wear is more uniformly distributed, thus eliminating "grooving" of head at crushing point; due to uniform wear, head does not have to be adjusted or concaves reset as frequently; power consumption and peak loads formerly obtained at close settings are greatly reduced; more uniform product and less objectionable fines than with old concaves at fine settings.**

***These new concaves differ from all other types, in that if the crushing head is in fair condition you can install new Non-Choking concaves without purchasing a new head. They are further described in Leaflet 2132.***

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organizing a company to purchase and develop a graphite mine near Burnet, Tex.

**Pacific Phosphate and Chemical Co.**, Portland, Ore., announces plans to construct a new plant near Kenton to cost approximately $25,000. The company manufactures agricultural minerals and composts, specializing in tri-calcium phosphate.

## Cement Products

**North Hollywood, Calif.** A permit was granted recently to a truck company and Minnie Jewel to erect a plant for the manufacture of asphalt paving and cement products.

**H. R. Keller and C. E. Paul**, Sunbury, Penn., have made application for patents on a new type of concrete building unit. Their application states five claims of improvements and it is reported that four claims have been found valid by the patent office.

## Personals

**Robert M. Jolley, Jr.**, of the Kansas City office of the United States Gypsum Co., was married recently to Miss Dortha Morrow.

**Bert Koenig**, secretary of the Koch Sand and Gravel Co., Evansville, Ind., will take a leading part in the fall ceremonial of Hadi Temple of Shriners in Evansville.

**H. J. Bryson**, North Carolina state geologist, recently gave a talk over the radio at Raleigh, N. C., on the geology of the state, its mineral resources and the opportunity for development.

**H. L. Walter** of the Georgia Granite Corp., Elberton, Ga., was married recently to Margaret Elizabeth Ray. They will make their home in Elberton.

*F. J. Griffiths*

**F. J. Griffiths** has joined the Timken organization at Canton, Ohio. He has been elected director and president of the Timken Steel and Tube Co. **M. T. Lothrop**, president of the Timken Roller Bearing Co., has been made chairman of the board of the Timken Steel and Tube Co. Mr. Griffiths until recently was associated with the Republic Steel Corp. in the capacity of president of the Republic Research Corp.

**A. W. Boldebuck**, formerly in charge of the Chicago office of the Lidgerwood Manufacturing Co., has been appointed sales manager with headquarters at Elizabeth, N. J.

**Robert H. Pausch**, secretary of the Arrow Sand and Gravel Co., and secretary-treasurer of the Marble Cliff Quarries Co., was made grand commander of the Knights Templar of Ohio recently at a meeting in Toledo.

**Homer Hadley** of the Portland Cement Association addressed a meeting of the Washington State Association of County Commissioners and Engineers held in Spokane, Wash., recently, on "Concrete Bridge Design."

**R. P. Fuller**, general manager of the I. A. C. corporation of Mulberry, Fla., was the principal speaker at the chamber of commerce luncheon held in Winter Haven, Fla., recently. He spoke on the phosphate industry and its importance to Florida.

**La Monte J. Belnap** of the Worthington Pump and Machinery Corp., Harrison, N. J., has been elected chairman of the executive committee. Mr Belnap is succeeded as president by **Harry C. Beaver**, formerly vice-president. Mr. Belnap is also president of the Consolidated Paper Corp., Ltd.

**Charles H. Bauer** has been appointed general sales manager of the L. H. Gilmer Co., Philadelphia, Penn. Mr. Bauer is international president of the Automotive Boosters Clubs and is a member of a number of other organizations. For the past six years he has been manager of the automotive division of this company.

**C. B. Ireland**, vice-president of the Birmingham Slag Co., and **Louis J. Williams**, Universal-Atlas Cement Co. of Birmingham, have charge of the community chest canvassing work in a large section of the city. Mr. Williams is also chairman of the Rotary club boys' work committee, director of the Birmingham Boys' Club and is interested in the Boy Scouts.

**Harry L. Erlicher**, who entered the employ of the General Electric Co. as an office boy in the purchasing department, has been appointed purchasing agent, succeeding **L. G. Banker**, who retired on October 1 after completing 43 years continuous service with the company. In his new position Mr. Erlicher will direct purchases of materials aggregating more than $100,000,000 a year. Mr. Banker entered the employ of the old Thomson-Houston Electric Co., one of the predecessors of General Electric in 1888, as a clerk in the purchasing department. Mr. Banker went to Schenectady when that city was made official headquarters of the General Electric Co. in 1894. In 1914 he was appointed the company's purchasing agent and head of the purchasing department.

## Obituaries

**William H. Wattis**, head of the Six Companies, Inc., contractors for the Hoover dam project, died recently in Portland, Ore.

**Clyde Dark**, 46, was accidentally killed in a stone quarry near Scottsburg, Ind., September 28, by falling stone. He was superintendent of the plant.

**Lawrence Edinger**, 24, Silica, Ohio, died September 30 in Toledo hospital after he was crushed under a freight car in the yards of the Toledo Sand Stone and Glass Co.

## Manufacturers

**Westinghouse Electric and Manufacturing Co.**, East Pittsburgh, Penn., announces the appointment of **G. D. Browne** as manager of the general mill electrification division. Mr. Browne started with the Westinghouse company in 1906 upon graduating from Trinity College. The cement products field is included in his new duties. To serve the electrical requirements of all industries the industrial sales department has been reorganized under the direction of **O. F. Stroman**, industrial sales manager. The reorganized department is composed of units grouped according to the main classifications of industry. Two assistant sales managers and 14 divisional managers have been appointed and the new organization also provides for the grouping of specialized engineers with every sales division.

*O. F. Stroman*

*Bernard Lester*

*C. B. Stainback*

*G. D. Browne*

*J. M. McKibben, Jr.*

*G. E. Stoltz*

*J. W. Speer*

*E. B. Bremer*

*E. F. Mead*

**Bernard Lester** and **C. B. Stainback** have been appointed assistant sales managers. Mr. Lester will have general charge of directing from headquarters the development of business with industrial users of electrical equipment. Mr. Stainback will have charge of apparatus applying to these industrial groupings. Under Mr. Lester there has been created five industry divisional classifications with the following in charge: **G. E. Stoltz**, manager, mining and metal working electrification division; **G. D. Bowne**, manager, general mill electrification division; **J. W. Speer**, manager, machinery electrification division; **E. B. Bremer**, manager of the appliance electrification division, and **E. E. Mead**, manager, general industrial resale division. Nine divisions have been created under Mr. Stainback's supervision. They are headed by J. R. Olnhausen, manager, medium A.C. motor section; R. M. Davis, manager, medium D.C. motor section; R. O. Watson, manager, large motor section; D. H. Byerly, manager, small motor section; W. W. Reddie, manager, welding section; T. C. Kelley, manager, industrial heating apparatus; W. G. Balph, manager, safety switch section; W. H. McGillivray, manager, control section; and F. W. Horst, manager, cost section.

J. M. McKibbin, Jr., has been appointed manager of the promotion and advertising section and will function under the joint direction of the assistant sales managers.

O. F. Stroman, sales manager of the industrial department, has been with Westinghouse since 1903. Mr. Stroman has witnessed and participated in the major electrification of industry in his 28 years service with the electrical world.

Bernard Lester, assistant sales manager, has been with the Westinghouse company since 1905. He is active in electrical association work and is the author of a number of papers on motors and motor application.

C. B. Stainback, assistant sales manager, graduated from North Carolina State College in 1910 and has been associated with Westinghouse since graduation.

**Shepard Niles Crane and Hoist Corp.**, Montour Falls, N. Y., announces the new location of its Chicago office at 564 West Monroe St., effective October 1.

**Triumph Electric Corp.**, Cincinnati, Ohio, announces it has concluded a license agreement with the Burke Electric Co. by which TR super high torque across the line motors will be available with welded steel frame construction in N. E. M. A. standard dimensions in all ratings and also in open and fully enclosed fan cooled types.

**American Rolling Mill Co.**, Middletown, Ohio, announces the following changes in personnel: R. C. Todd as assistant vice-president of the company. His new duties will involve special work in connection with the company's sales activities. Mr. Todd has been with the American Rolling Mill Co. since 1900 and has served in many capacities with the organization. It also announces that H. M. Richards has been appointed assistant general manager of sales. He was formerly manager of the Cleveland sales district. Foster E. Wortley has been appointed as Cleveland district manager to succeed Mr. Richards. At present he is assistant district manager of the Pittsburgh office. O. L. Conley has been appointed assistant manager of the Cleveland district.

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